NASA Technical Memorandum 80112

NASA-TM-80112 19790018926

# A FLIGHT INVESTIGATION OF BASIC PERFORMANCE CHARACTERISTICS OF A TEETERING-ROTOR ATTACK HELICOPTER



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JUNE 1979

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Space Administration
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| 1 Report No | 2 Government Accession No | 3 Recipient's Catalog No |
|---|---|---|
| NASA TM 80112 | | |

| 4 Title and Subtitle | 5 Report Date |
|---|---|
| A Flight Investigation of Basic Performance Characteristics of a Teetering-Rotor Attack Helicopter | June 1979 |
| | 6 Performing Organization Code |
| 7 Author(s) | 8 Performing Organization Report No |
| Charles E. K. Morris, Jr. | |
| | 10 Work Unit No<br>791-40-43-01 |
| 9 Performing Organization Name and Address<br>NASA Langley Research Center<br>Hampton, VA 23665 | 11 Contract or Grant No |
| | 13 Type of Report and Period Covered<br>Technical Memorandum |
| 12 Sponsoring Agency Name and Address<br>National Aeronautics and Space Administration<br>Washington, DC 20546 | 14 Sponsoring Agency Code |

15 Supplementary Notes

(1) This work was jointly sponsored by NASA and the Structures Laboratory, USARTL (AVRADCOM) at Langley.
(2) Major contributors to this research were Messrs. M. A. Basnett, P. L. Deal and J. A. Fernandez of FMD, LaRC, NASA and Messrs. J. F. Bryant and W. A. Walls of FED, LaRC, NASA
(3) Some aircraft specifications were supplied by Bell Helicopter Textron.

16. Abstract

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| 17 Key Words (Suggested by Author(s)) | 18 Distribution Statement |
|---|---|
| Helicopter<br>Performance<br>Teetering rotor | UNCLASSIFIED - UNLIMITED<br><br>STAR CATEGORY 02 |

| 19 Security Classif (of this report) | 20 Security Classif (of this page) | 21 No of Pages | 22 Price* |
|---|---|---|---|
| UNCLASSIFIED | UNCLASSIFIED | 112 | $6.50 |

* For sale by the National Technical Information Service, Springfield Virginia 22161

# A FLIGHT INVESTIGATION OF BASIC PERFORMANCE CHARACTERISTICS OF A TEETERING-ROTOR ATTACK HELICOPTER

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## SUMMARY

Flight data were obtained with an instrumented AH-1G helicopter having uninstrumented, standard main-rotor blades. The data are presented to facilitate the analysis of data taken when the same vehicle was flown with instrumented main-rotor blades built with new airfoils. Test results include data on performance, flight-state parameters, pitch-link loads and blade angles for level flight, descending turns and pull-ups. Flight test procedures and the effects of both trim variations and transient phenomena on the data are discussed.

## INTRODUCTION

A flight investigation of rotorcraft-airfoil characteristics has been conducted with a high-speed, teetering-rotor, AH-1G helicopter that used a series of main-rotor blades. This research was jointly sponsored by NASA and the Structures Laboratory, USARTL (AVRADCOM) at Langley. The primary purpose of the investigation was to relate airfoil design methods to the three-dimensional, unsteady-flow environment of a full-scale rotor. Initial results for three blade sets, each with one experimental airfoil, have been published in reference 1. Full analysis of the data for the experimental blades requires reference to data on the basic vehicle.

The purpose of this paper is to present appropriate results from the flight investigation of the AH-1G of reference 1 with standard production main-rotor blades. Some data on this baseline configuration is already available. Aerodynamic, structural, and acoustic data in references 2 to 5 were obtained with an AH-1G equipped with numerous sensors mounted not only on the fuselage but also within a glove on each main-rotor blade. Results of flight tests on stability, control and performance parameters are given in references 6 to 8, maneuver data are presented in references 8 to 13. Although these references are useful, they do not contain enough of the data required for a direct comparison between test results from baseline and experimental main-rotor blades.

Baseline data were obtained using the aircraft of reference 1 with uninstrumented, standard blades. The resulting data set included performance and flight-state parameters, pitch-link loads, blade flapping, and blade pitch. The flight test conditions were the same as those with the experimental blades; they consisted of level flight at airspeeds up to about 160 knots and maneuvers that included symmetrical pull-ups and descending turns. All test points were taken with basically the same, nominally clean configuration as used with the experimental blades. The resulting rotor-thrust coefficients for level flight ranged between 0.0034 and 0.0045.

## SYMBOLS

Positive senses of some forces, angles, and angular rates are presented in figure 1.

$A_{0f}$ main-rotor collective pitch at 0.75R commanded at the swashplate, deg

$A_{0,tr}$ tail-rotor collective pitch, deg

$A_{1f}$ main-rotor, cyclic pitch commanded at the swashplate (coefficient of $\cos\Psi$ in expression for $\theta_s$), deg

a speed of sound, m/sec

$B_{1f}$ main-rotor, cyclic pitch commanded at the swashplate (coefficient of $\sin\Psi$ in expression for $\theta_s$), deg

$C_L{}'$ vehicle load coefficient, $\frac{Wn_z}{\rho\pi R^2(\Omega R)^2}$

$C_Q$ main-rotor mast torque coefficient, $\frac{Q}{\rho\pi R^3(\Omega R)^2}$

c airfoil chord, m

$F_{pl}$ pitch-link load, positive for compression, N

g acceleration due to gravity, 9.81 m/sec$^2$

$h_p$ density altitude, m

$i_h$ horizontal-tail incidence angle, deg

$M_h$ reference blade-tip Mach number, $\frac{\Omega R}{a}$

N number of rotor revolutions, initiated at $X = 0^\circ$

$n_x$, $n_y$, $n_z$ orthogonal set of load factors for aircraft center of gravity, g units

$p_f$, $q_f$, $r_f$ orthogonal set of fuselage angular rates, rad/sec

$p_m$ measured noise-boom static pressure, Pa

$p_c$ corrected, freestream static pressure, Pa

Q main-rotor mast torque, N-m

$q_m$ measured nose-boom dynamic pressure, Pa

| | |
|---|---|
| $q_c$ | corrected, freestream dynamic pressure for fuselage velocity, Pa |
| R | main-rotor radius, m |
| r | radial distance from axis of rotation to blade element, m |
| $T_m$ | measured total temperature, deg C |
| t | time, seconds |
| V | true aircraft airspeed, m/sec |
| $V_\infty$ | relative freestream wind velocity, m/sec |
| W | aircraft gross weight, N |
| X, Y, Z | orthogonal set of aircraft body axes |
| x | airfoil abscissa, positive rearward from leading edge, m |
| y | airfoil ordinate, displacement perpendicular to airfoil chord line, m |
| $\alpha_f$ | fuselage angle of attack, deg |
| $\beta_f$ | fuselage angle of side-slip, deg |
| $\beta_s$ | main-rotor, shaft-axis teeter angle, (where $\beta_s = a_0 - a_1 \cos\psi - b_1 \sin\psi - \ldots$) positive upward, deg |
| $\delta$ | hydraulic control-rod displacement, counts |
| $\delta_0$ | collective control-rod displacement, counts |
| $\delta_1$ | lateral control-rod displacement, counts |
| $\delta_2$ | longitudinal control-rod displacement, counts |
| $\theta_f$ | fuselage pitch attitude, deg |
| $\theta_s$ | main-rotor, shaft-axis blade pitch at 0.75R, (where $\theta_s = A_0 - A_1 \cos\psi - B_1 \sin\psi - \ldots$) deg |
| $\mu$ | tip speed ratio, $V/(\Omega R)$ |
| $\rho$ | mass density of air, $kg/m^3$ |
| $\sigma$ | standard deviation at test-point condition |
| $\phi_f$ | fuselage roll attitude, deg |
| $\psi$ | main-rotor blade azimuth angle measured from downwind position in direction of rotor rotation, deg |

$\Omega$ main-rotor rotational speed, rad/sec

$\Omega_0$ nominal main-rotor rotational speed, 10.8 rad/sec

Bars over symbols denote mean values; circumflex marks (^) over symbols denote peak-to-peak amplitudes of oscillations for one rotor revolution.

## EQUIPMENT AND PROCEDURES

### Test Vehicles

The test vehicle was an attack helicopter modified by the removal of weapons systems and the installation of data systems. This aircraft is shown in the drawing of figure 2 and the photograph of figure 3. Basic aircrft characteristics are given in Table I. Changes from the production configuration include the installation of an instrumentation boom at the nose and a data-system canister on top of the main-rotor mast. In addition, the forward weapons assembly was replaced by a dummy chin turret and an instrumentation rack in the ammunition bay. The total set of modifications should produce no significant variations from the aerodynamic and inertial properties of the production aircraft in the clean configuration (i.e., without wing stores).

A single airfoil contour, commonly identified as the BHC 540 airfoil, is used for the main-rotor blades. Wind-tunnel data for the 540 airfoil is given in reference 14. This symmetrical airfoil was derived by making straight-line extensions from about the 51 percent to the 129 percent chord location for an NACA 0012 airfoil. Coordinates for the resulting airfoil are given in Table II; a drawing of the shape is presented in figure 4. Comparisons of nominal and measured profile contours are shown in figure 5.

### Data System

The aircraft was equipped with a Piloted Aircraft Data System (PADS) to measure and record flight data. The PADS channels used Pulse Code Modulation (PCM) technique in the digitization of data measurements from fuselage-mounted sensors. Other PADS channels operated with frequency modulation (FM) to produce analog-data records of rotor measurements. All data were recorded with an on-board tape recorder.

The PADS-PCM system provided measurements of the aerodynamic and inertial flight states, control positions, and other parameters such as main-rotor rotational speed. A detailed description of the data channels for the final data-system configuration is given in Table III and Appendix A. Photographs of the nose-boom sensors and temperature sensors are presented in figure 6. The PADS-PCM system used conventional signal-conditioning and recording equipment. The 10-bit digital data words (0 to 512 counts plus parity) were sampled 80 times per channel per second and then entrained on a single tape track. Signal conditioning components, the tape recorder and most of the gyroscopes were mounted on a rack located in a thermally-protected environment in the ammunition bay (fig. 7).

The PADS-FM system acquired measurements of mast torque, pitch-link load and both pitch and teeter angles of the blades. Some of the sensor installations are illustrated in figure 8. Appendix A provides general information on these sensors. Instrumentation leads for all of the rotor channels were connected to signal conditioning in the ammunitions bay through a slip-ring assembly housed at the top of the main-rotor mast (figure 8(a)). The PADS-FM system used multiplexing and voltage control oscillators operated with a frequency deviation of ±1 kHz. This is compatible with analog-to-digital systems for data reduction with 200 Hz filters (with amplitude ratios down approximately 3 db at 200 Hz).

## Data Reduction

Data reduction consisted of two basic steps. First, flight-tape data were converted into edited, digitized records expressed in engineering units. No further corrections were needed for PADS-FM data at that point. Second, a set of simultaneous records of PADS-PCM data were processed to yield corrected values of data, including dimensionless parameters, for a given instant of time in a test-point record (Appendix B).

## Flight-Test Procedures

The need to obtain data from both standard and experimental blade sets for comparison led to emphasis on repeatable, well controlled test-point conditions. However, precise predetermined values of flight-test parameters were difficult to obtain on any given flight. These parameters include advance ratio, vehicle load coefficient, and $M_h$ , reference tip Mach number. The limiting factors in achieving repeatability were a lack of precise real-time data on in-flight conditions and contraints imposed by atmospheric conditions, such as turbulence and visibility. The achievement of specific flight-test parameters was also affected by operational limits on rotor rotational speed. Because of these constraints, procedures were adopted to hold airframe configuration and center-of-gravity location as invariant as possible while a data base of adequate size was obtained for a limited number of test conditions.

Most data were obtained during level-flight sweeps and two types of collective-fixed maneuvers. The level-flight sweeps began with a test point at an indicated airspeed of 50 to 60 knots. (The minimum airspeed was dictated by limitations on the accuracy of nose boom data due to adverse main-rotor wake effects.) Speed-sweep data were typically taken in nominal 10-knot increments up to the maximum airspeed, as determined by engine power or transmission torque limits. The resulting advance ratios ranged from approximately 0.12 to 0.35. Each maneuver was flown with the collective set for trimmed level flight at the target airspeed. During the descending turns, altitude was lost to maintain airspeed while target values of either normal acceleration or roll angle were held without cyclic inputs for at least a full second. The symmetrical (longitudinal plane) pull-ups were executed to achieve target values of normal acceleration concurrent with a specific value of pitch attitude. That pitch altitude was the same as required for level flight at the target value of airspeed. Normal acceleration for these and other maneuvers was generally limited to a value of 2 g's, while airspeed targets ranged from 80 to 140 knots.

## RESULTS

The data contained in this report are presented so as to compliment the existing data sets in references 2 to 13 and to aid in the interpretation of data obtained with new main-rotor blades flown on the same helicopter (ref. 1). Level-flight data are given in figures 9 through 18 and in Appendix C; maneuver data are presented in figures 19 through 27. The interpretation of various size sets of data and the significance of conditions influencing the data are discussed.

### Level Flight

The flight data of figure 9 and the associated listings in Appendix C provide some knowledge about both vehicle characteristics and test-point repeatability. These data were obtained during a single flight that included one speed sweep at each of four nominal altitudes. The time for each test point was selected on the basis of overall steadiness from flight-parameter histories for each test condition. The test-point selection parameters include aerodynamic attitude, angular rates, and normal acceleration. A single curve is faired through most data sets to help to define trends and to provide a clear reference for comparison with the individual points. All data points were taken with controls fixed and a constant rotor-speed setting.

Figure 9(a) presents typical performance results. Small variations are shown in vehicle load coefficient, which is a measure of inertial and not aerodynamic load; these variations are attributable to changes in fuel weight, air density, and fluctuations in both rotor speed and normal load factor. Rotor-torque coefficient data shows the expected trend with tip-speed ratio. At low airspeeds, the low levels of directional and speed stability produce some scatter.

Most of the attitude and controls data (fig. 9(b) and 9(c), respectively) agree well with the faired curves. The scatter in both roll and sideslip data result from the freedom to trim the vehicle for steady, level flight with an allowable range of combinations of those parameters. The scatter in roll across the range of tip-speed ratios indicates that the pilot judged trim primarily on the basis of sideslip. The scatter in sideslip, tail-rotor collective and possibly main-rotor torque are reduced at higher tip-speed ratios by the increased contribution of the vertical tail fin to directional stability (ref. 6) which resulted in increased consistency in trim settings.

The typical data histories given in figures 10 and 11 give some insight into the preceding sets of data. (Data histories are given for test points 1, 8, and 13 in Appendix C.) Many of the traces of unsmoothed, uncorrected data in figure 10 have a strong two-per-revolution oscillation, due to blade loads, imposed on much lower-frequency variations. Differences in the magnitude of alternating peaks for roll rate and lateral acceleration are attributible to both structural impedence and blade balance.

The relatively greater steadiness of the aircraft at the medium-speed condition of figure 10 is typical of all the speed-sweep runs. Low-speed difficulties in achieving trim have already been noted; at high airspeeds, the higher vibration level and rotor gust sensitivity adversely affect the pilot's task of managing the rotor thrust vector to maintain both lift and propulsive forces. Figure 12 provides another means of evaluating steadiness: the standard deviation of sensor measurements during long intervals for test points in Appendix C. The minimum-value curves for each parameter indicate the best results for any given tip-speed ratio. The potential for relatively stable flight is indicated by these data and by pilot opinion to lie between tip-speed ratios of approximately 0.15 and 0.25.

The results of using several pilot techniques for level-flight data points are shown in figures 13 and 14. The data for figure 13 were obtained with guidelines which called for achieving trimmed test-point conditions about once per minute and holding a well-controlled test point of only a few seconds. Test objectives for the data of figure 14 required the repetition of test points and the continuation of control-fixed test-point periods for up to seven seconds. The resulting scatter for the latter case (fig. 14) indicates the complexity and severity of that task for the typical atmospheric conditions available. All subsequent testing was conducted with the less strenuous guidelines.

More insight into mast torque data can be gained in figure 15. The higher frequency content of the traces are two-per-revolution: torque due to blade drag and bending-moment cross talk on the strain-gauge bridge produce that effect. The frequently observed variation with about a 2.5 per revolution period is related to the torsional natural frequency of the mast, drive system and, possibly, some coupling with the engine governor (ref. 9). A much longer period variation, difficult to observe in this limited data presentation, also affects the determination of mast torque for nominally steady conditions.

Much of the flight-state and performance data presented thus far indicate that instantaneous values of level-flight data should not be interpreted strictly. This type of data, such as given in figures 9, 13, 14, appear to be influenced by the transient phenomena observed in figures 10 and 15 and, possibly, by pilot technique. These observations suggest that data trends, defined by adequately large data sets, are more useful at least for performance data. In contrast, the proper interpretation of a set of data for a single point in time may require detailed attention to all of the flight-state and control-parameter data available.

The blade-angle data of figure 9 can be further examined with the unsmoothed parameter histories of figure 16, which presents data for cases 5, 6 and 7 in Appendix C. (Each revolution is initiated at $0^{o}$ rotor azimuth.) These traces show that blade motion is not always very close to a simple first-harmonic pattern. Since laboratory tests indicated that the sensors should give good results at the observed frequencies, analysis of the blade-angle data should consider aerodynamic and inertial effects on the sensors themselves, aeroelastic effects in the control system and the actual departure of blade motion from the simple motion typical of most of the level-flight cases.

The pitch-link load data of figures 17 and 18 show some consistent patterns. The most pronounced feature in the traces in figure 17 is a large negative "spike" (indicating a leading-edge down blade moment) in the trace near a rotor azimuth of 180° . Figure 18 helps to show how the magnitude of that "spike" consistently increases with increases in tip-speed ratio. The smaller positive "spikes" in the first and fourth quadrants of the rotor disk should be explainable on the basis of blade-wake interactions (ref. 3 and 4).

## Maneuvering Flight

Test conditions other than steady, level flight were selected on the basis of the information they yielded and the ease of achieving consistent sets of well-controlled data points. Conventional climbs, descents, descending turns, and symmetrical pull-ups were found to yield good data. Level turns usually were too difficult to control due to rotor interaction with the old wake; other maneuvers cited in references 9 and 10 were either too easily influenced by pilot technique or too likely to produce rotor overspeed problems.

Representative flight data for a descending turn are presented in figures 19, 20 and 21. Test-point time, given as t = 3.1 seconds for figure 19, was determined on the basis of steadiness of angular rates, dynamic pressure and mean values of normal acceleration. Although the turn is nominally a steady maneuver, parameters such as fuselage pitch, rotor speed and dynamic pressure were observed to change slightly during the test-point period. Rotor data for a much briefer segment of the same data run are presented in figure 20. That data shows that pitch-link load and blade motion do appear to be highly periodic during the record interval. A typical decline in power required (for the same interval as figure 20) is seen in figure 21.

Representative data for a symmetrical pull-up are given in figures 22, 23 and 24. The test point was usually choosen close to the time at which fuselage pitch attitude was the same as for level flight at that airspeed. The test point was used if roll and yaw rates were low, controls remained nearly fixed and both rotor speed and dynamic pressure did not vary too rapidly. (Rotor speed was deliberately kept low when entering the maneuver to compensate for the increase anticipated during the maneuver execution). Rotor data in figure 23 is not periodic, and the variations in these parameters are typical. In figure 24, the mast torque data for the same set of revolutions as figure 23 show a steady decrease in power required as significant changes occur in the energy state of both the rotor and the fuselage (ref. 10). The slow torsional oscillations observed in figure 15 are clearly observeable in the last part of the pull-up record.

Some basic trends were observed in the maneuver data, particularly for the turns. Typical records of pitch-link load for left and right descending turns are presented in figures 25 and 26. The amplitude of the oscillatory load is seen to increase with tip-speed ratio at nearly constant values of vehicle load coefficient. That increase is primarily due to the growth of the negative "spike" near 180° azimuth. The trends for oscillatory loads presented in figure 27 were obtained with data for over twenty left and twenty right turns. The most notable result is that there is no strong effect of rotor load (and vehicle load coefficient) at tip-speed ratios below about 0.20. Pull-up data showed the same trend but with much more scatter in the basic data. The need to have easily interpreted data leads to the use of manuever tip-speed ratios of 0.25 or greater.

Three factors lead to the adoption of a tip-speed ratio of 0.25 for maneuvering flight with the experimental blades. First, obtaining an adequately large set of data points at more than one value of tip-speed ratio would require a much larger flight program. Second, reference level-flight test conditions are more easily controlled at or below 0.25; third, rotor loads for maneuvers appear to follow more easily interpreted trends at or above that tip-speed ratio.

## CONCLUDING REMARKS

Data were obtained for a production configuration AH-1G helicopter in level and maneuvering flight. These data are presented as a reference level for studies of the same vehicle flown with new, experimental main-rotor blade. Both the complexity of trimming the vehicle and various transient phenomena affect the data. The most easily observed effect is scatter in the data for a given test condition. Results indicate that reasonable procedures for flight tests with the new blades include the following: progressing in an orderly but rapid manner through the set of test-point conditions for level flight, and conducting maneuvers with a target value of about 0.25 for tip-speed ratio. Typical sets of data were presented for these procedures.

## APPENDIX A - INSTRUMENTATION

### Aerodynamic Flight-State Data

Static and dynamic pressures were sensed with probes mounted on the nose boom (fig. 6(a)) and tranducers mounted in the aircraft nose compartment. The static pressure probe was aligned into the local wind by an annular-vane and swival-mount assembly. Even for hover, the probe was shown to provide good readings. Rotor-induced motions were damped by a rubber sleeve fitted over the swivel point. The shielded total-pressure probe allowed for flow misalignment, with respect to the probe, of more than 30 degrees (ref. 15). Dynamic pressure was measured by a differential pressure transducer as the difference between total and static pressures. Flow restrictors were installed in the tubes leading from the total and static pressure probes to damp rotor-induced oscillations that were strong at low airspeeds; the restrictors produced a lag time-constant of about 0.3 seconds. Dynamic pressure was recorded on a regular channel and a high-sensitivity channel that functioned below 1.41 kPa; similarly, static pressures above 82.5 kPa were also recorded on a high sensitivity channel.

Angle of attack and sideslip angle were sensed with vanes mounted on the nose boom (fig. 6(a)). The characteristics of these vanes are given in reference 16. The data traces for these vanes show an oscillation at the blade-passage frequency of about one degree peak-to-peak amplitude. This oscillation is attributable to boom motion at the same frequency.

Temperature was measured by probes mounted on the port side of the aircraft. The PADS-PCM data for total temperature were obtained with the larger, shielded probe in figure 6(b). The small probe provided measurements for a cockpit instrument used to guide adjustments in test-point conditions. Exploratory flight tests indicated that sensor measurements were unaffected by sideslip angles of up to at least 15 degrees.

### Inertial Flight-State Data

Fuselage-mounted sensors provided data on the inertial flight state. Three independent linear accelerometers were mounted in a common fixture located on the deck behind the pilots seat. A combination roll-and-pitch attitude gyroscope and three independent angular-rate gyroscopes were mounted in the ammunition-bay instrumentation rack. The heading gyroscope in the pilot's instrument panel was used to measure yaw.

### Control-Position Data (PADS)

String-type potentiometers were used to measure control positions. The potentiometer "strings" were attached to following: the upper end of the hydraulic cylinders at the main-rotor swash-plate assembly; the support tube for the horizontal fin; the chain linkage that commands tail-rotor collective at the rear gear box; and the first linkage driven by the pilot's pedals. Pedal-position data were calibrated in units of blade pitch. Measurements of collective pitch of the tail rotor include the effects of control-system slop and deformation as well as commands from the stability augmentation system.

## Engine/Rotor Data

The data system also measured some rotor and engine parameters. Main-rotor speed was sensed for a normal and a high-sensitivity channel by a tachometer generator coupled to the tachometer shaft on the main transmission. (The same signal drove the cockpit displays of rotor rpm.) Later in the flight test program, the systems used to drive cockpit indicators of engine torque pressure (a measure of torque) and fuel quantity were utilized to measure those parameters for PADS.

## Rotor/Blade Data

Blade pitch and teeter angles were measured by potentiometers mounted at the rotor hub (fig. 8(a)). Teeter angle was sensed by a linear potentiometer that linked the mast trunion with the inboard section of the yoke, the flexible plate to which both blades were attached. A positive teeter angle produced an extension in the connecting road. Blade pitch was sensed by a string-type potentionmeter mounted on the outboard end of the yoke for the reference blade; a wire connected the spring-loaded potentiometer to the inboard end of the blade grip. Increasing blade angle caused the wire to retract. Since teeter angles were small, blade pitch angles were equivalent to angles referenced to a shaft axis system. Both angles were measured with sensor accuracy of about $0.1^{\circ}$. (No coupling, kinematic or otherwise, was found between teeter and pitch.).

Blade azimuth was measured by a shaft encoder. This device connected the top of the mast to the top of a nonrotating standpipe that held leads from the canister slipring assembly. The 16 step ($22.5^{\circ}$ increment) signal was recorded by both PCM and FM systems.

Pitch-link load and mast torque were measured with strain-gauge bridges (fig. 8(b)). The pitch-link bridge was attached to the thin-walled midpoint of the link and was carefully temperature compensated. An accuracy of $\pm$36N was determined during calibration. The mast bridge was located close to the trunion to minimize bending effects. Mast torque calibrations in a combined-loads test machine (fig. 28) showed negligible cross-talk on torsion due to thrust and indicated an accuracy of about +110 N-m. A mast thrust channel was installed, calibrated and operated during flight test; however, cross-talk rendered that channel unuseable.

## Preflight Calibrations

Preflight calibrations consisted of four signals recorded on the flight tape. Each channel for a strain-gauge bridge received an initial measurement of ambient conditions, a two-step bridge-shunt calibration producing a known voltage change, and, last, another ambient record. All other channels, the majority of the PADS-PCM, received an ambient measurement followed by three voltage levels impressed on the signal-conditioning system. These processes essentially calibrated the signal-conditioning system but not the sensors.

## APPENDIX B - PADS-PCM DATA REDUCTION

The initial step in PADS-PCM data reduction is the treatment of uncorrected engineering-units records edited from flight tapes. The sample rate was sufficiently high to show the effects of rotor-induced vibrations, and the digital precision produced noticeable step changes for some channels. Therefore, before corrections were applied, the data for each channel were smoothed to yield results descriptive of low-frequency aircraft motions, not local vibrations or the effects of digitization.

The flight-state data were calculated in several steps. First, dynamic and static pressure were corrected from measured to true values with airspeed-calibration data shown in figure 29. Airspeed, altitude, static temperature, the speed of sound, and other parameters were then calculated with the compressible-flow equations of reference 17. Next, the nose-boom flow-vane data were resolved to body axes; both these results and airspeed were corrected for the effect of angular rates about the vehicle center of gravity. Linear acceleration values were also corrected for the effects aircraft angular rates and accelerometer location; angular accelerations were calculated by differentiating smoothed records of angular rate. Rate-of-climb data were determined using data for attitude and c.g. velocity.

Reduced data on main-rotor control position are expressed in terms of commanded blade angle. Measurements from several actuators were used in equations that account for linearized kinematic coupling between cyclic and collective inputs. A small amount of nonlinear coupling between the two cyclic systems was observed but not accounted for. Other sources of error include mechanical slop and aeroelastic deformation.

## APPENDIX C - TEST-POINT DATA LISTINGS

This appendix contains sets of reduced, corrected data for each of a series of test points. All of the data were obtained with the PADS-PCM system. The listing format is divided into segments for test-point identification and values of configuration variables, flight state, control positions and some rotor parameters. Each test point is identified by flight number, run number and time.

The only configuration parameters listed are aircraft total weight and center of gravity. Both of these were calculated from the results of weight-and-balance procedures for the empty aircraft and the calculated effects of measured pilot, observer and fuel weight. The vehicle center of gravity is described with the reference system used by the aircraft manufacturer. The reference point is the intersection of the main-rotor mast center-line and hub flapping axis; it has reference body-axis coordinates given below:

longitudinal (X axis, station line) .................. 5.08 m (200. in)
lateral (Y axis, buttline) ........................... 0.0 (0.0 in)
vertical (-Z axis, waterline) ........................ 3.88 m (152.8 in)

Aerodynamic and inertial flight-state data contains values for 33 interrelated parameters. True airspeed and Mach number describe those values for the vehicle center of gravity. Rate of climb is included even though total accuracy is relatively poor. The axis system of figure 1 is use for the inertial data.

Control-angle data is calculated using calibrations taken during static conditions. The difference between measured pedal-position commands and tail-rotor angles includes the cumulative effects of mechanical distortion and the SCAS system. Values of main-rotor blade pitch are affected to some degree by aeroelastic distortions too.

The set of rotor parameters includes data relevent to rotor-airfoil studies and general data reduction. The hover tip Mach number is the tip value contributed by blade rotational speed. Control-axis angle of attack is simply the sum of calculated rotor $B_{1f}$ and body (fuselage) angle of attack, since the shaft inclination is a nominal 0.0 degrees and the small amount of allowable transmission motion is not considered. Both the ratio of Reynolds number to Mach number and listed range of Mach number help to define the blade-section operating envelope. Thrust factor is simply the nondimensionalizing quantity $\rho\pi R^2(\Omega R)^2$ in the donominator of some rotor parameters, such as vehicle load coefficient, $C_L'$.

NASA LANGLEY FLIGHT DATA   AH-1G  ----  PADS PCM DATA

FLIGHT NO. 011   AIRCRAFT TOTAL WT = 35477. N   LOADED CG X= 5.04 M = 198.4 IN
RUN NO. 1   7976. LB   Y= -.00 = -.0
TIME 68021.70 (SEC)   Z= 1.81 = 71.3

AERODYNAMIC FLIGHT STATE

| | | | | |
|---|---|---|---|---|
| T. AIRSPEED= 51.0 KT | DYNAMIC PRES= | .42 KPA | = | 8.8 PSF |
| A/C MACH NO= .079 | STATIC PRES= | 95.0 KPA | = | 1983. PSF |
| | TOTAL TEMP= | 271.8 DEG K | = | 489.2 DEG R |
| | STATIC TEMP= | 271.5 DEG K | = | 488.6 DEG R |
| BODY ALPHA= 1.2 DEG | DENSITY= | 1.22 KG/M3 | = | .00237 SLUG/FT3 |
| BODY BETA= 1.1 DEG | DENSITY ALT= | 52. M | = | 171. FT |
| | SONIC SPEED= | 330.8 M/SEC | = | 1085. FPS |
| | RATE OF CLIMB= | -82. M/MIN | = | -269. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 26.23 | 86.1 | .005 | 26.19 | 85.9 | .016 | ROLL | -.4 | .011 | .102 |
| Y | .50 | 1.6 | .013 | .52 | 1.7 | .035 | PITCH | -1.8 | .021 | -.053 |
| Z | .53 | 1.7 | -.988 | .53 | 1.8 | -.989 | YAW | 338.0 | .011 | .042 |

CONTROL ANGLES

| | | | |
|---|---|---|---|
| M.R. COLL= | 7.2 DEG | HORIZ FIN= | 6.5 DEG |
| A1= | -1.1 DEG | T.R. COLL= | 1.8 DEG |
| B1= | 3.2 DEG | PEDAL POS= | 1.6 DEG |

ROTOR PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| ADVANCE RATIO= | .114 | SHAFT ALPHA= | 1.2 DEG | PER CENT RPM= | 100.7 |
| HOVER TIP MACH= | .69 | CONTROL ALPHA= | -2.0 DEG | RN/MACH= | .163E+08 |
| TIP MAX-MACH= | .77 | DELTA PSI= | -1.1 DEG | CLP= | .00387 |
| TIP MIN-MACH= | .61 | | | | |
| .9R MAX-MACH= | .70 | | | | |
| .9R MIN-MACH= | .54 | THRUST FACTOR= | .905E+07 N = .203E+07 LB | | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 35375. N LOADED CG X= 5.04 M = 198.5 IN
RUN NO. 2 7953. LB Y= -.00 = -.0
TIME 68121.20 (SEC) Z= 1.81 = 71.3

AERODYNAMIC FLIGHT STATE

| | | | |
|---|---|---|---|
| T. AIRSPEED= 57.4 KT | DYNAMIC PRES= .53 KPA | = | 11.1 PSF |
| A/C MACH NO= .089 | STATIC PRES= 94.8 KPA | = | 1980. PSF |
| | TOTAL TEMP= 271.7 DEG K | = | 489.0 DEG R |
| | STATIC TEMP= 271.2 DEG K | = | 488.2 DEG R |
| BODY ALPHA= 2.1 DEG | DENSITY= 1.22 KG/M3 | = | .00236 SLUG/FT3 |
| BODY BETA= -.7 DEG | DENSITY ALT= 60. M | = | 198. FT |
| | SONIC SPEED= 330.7 M/SEC | = | 1085. FPS |
| | RATE OF CLIMB= -113. M/MIN | = | -371. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 29.50 | 96.8 | -.005 | 29.49 | 96.7 | -.007 | ROLL | -.0 | .000 | -.022 |
| Y | -.37 | -1.2 | .018 | -.37 | -1.2 | .013 | PITCH | -1.5 | .006 | .008 |
| Z | 1.10 | 3.6 | -.985 | 1.10 | 3.6 | -.985 | YAW | 317.8 | -.002 | -.029 |

CONTROL ANGLES

| | |
|---|---|
| M.R. COLL= 6.7 DEG | HORIZ FIN= 6.5 DEG |
| A1= -1.2 DEG | T.R. COLL= 1.6 DEG |
| B1= 2.9 DEG | PEDAL POS= 1.1 DEG |

ROTOR PARAMETERS

| | | |
|---|---|---|
| ADVANCE RATIO= .129 | SHAFT ALPHA= 2.1 DEG | PER CENT RPM= 100.7 |
| HOVER TIP MACH= .69 | CONTROL ALPHA= -.8 DEG | RN/MACH= .163E+08 |
| TIP MAX-MACH= .78 | DELTA PSI= .7 DEG | CLP= .00386 |
| TIP MIN-MACH= .60 | | |
| .9R MAX-MACH= .71 | | |
| .9R MIN-MACH= .53 | THRUST FACTOR= .904E+07 N = .203E+07 LB | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 35308. N LOADED CG X= 5.04 M = 198.5 IN
RUN NO. 3 7938. LB Y= -.00 = -.0
TIME 68219.70 (SEC) Z= 1.81 = 71.3

AERODYNAMIC FLIGHT STATE

| | | | | |
|---|---|---|---|---|
| T. AIRSPEED= 65.2 KT | DYNAMIC PRES= | .68 KPA | = | 14.3 PSF |
| A/C MACH NO= .102 | STATIC PRES= | 94.7 KPA | = | 1978. PSF |
| | TOTAL TEMP= | 271.7 DEG K | = | 489.1 DEG R |
| | STATIC TEMP= | 271.2 DEG K | = | 488.1 DEG R |
| BODY ALPHA= 2.5 DEG | DENSITY= | 1.22 KG/M3 | = | .00236 SLUG/FT3 |
| BODY BETA= 1.1 DEG | DENSITY ALT= | 68. M | = | 224. FT |
| | SONIC SPEED= | 330.7 M/SEC | = | 1085. FPS |
| | RATE OF CLIMB= | -167. M/MIN | = | -549. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 33.50 | 109.9 | -.008 | 33.51 | 109.9 | -.001 | ROLL | .4 | -.009 | .020 |
| Y | .64 | 2.1 | .006 | .62 | 2.0 | .011 | PITCH | -2.3 | -.005 | -.033 |
| Z | 1.45 | 4.8 | -1.000 | 1.45 | 4.8 | -1.000 | YAW | 298.1 | -.001 | -.031 |

CONTROL ANGLES

| | | | |
|---|---|---|---|
| M.R. COLL= | 6.6 DEG | HORIZ FIN= | 6.7 DEG |
| A1= | -.8 DEG | T.R. COLL= | 1.4 DEG |
| B1= | 3.5 DEG | PEDAL POS= | .9 DEG |

ROTOR PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| ADVANCE RATIO= | .146 | SHAFT ALPHA= | 2.5 DEG | PER CENT RPM= | 100.9 |
| HOVER TIP MACH= | .69 | CONTROL ALPHA= | -1.0 DEG | RN/MACH= | .163E+08 |
| TIP MAX-MACH= | .80 | DELTA PSI= | -1.1 DEG | CLP= | .00390 |
| TIP MIN-MACH= | .59 | | | | |
| .9R MAX-MACH= | .73 | | | | |
| .9R MIN-MACH= | .52 | THRUST FACTOR= | .906E+07 N = .204E+07 LB | | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

| | | | |
|---|---|---|---|
| FLIGHT NO. 011 | AIRCRAFT TOTAL WT = 35286. N | LOADED CG X= 5.04 M | = 198.5 IN |
| RUN NO. 4 | 7933. LB | Y= -.00 | = -.0 |
| TIME 68271.20 (SEC) | | Z= 1.81 | = 71.3 |

AERODYNAMIC FLIGHT STATE

| | | | |
|---|---|---|---|
| | DYNAMIC PRES= | .86 KPA | = 18.0 PSF |
| | STATIC PRES= | 94.9 KPA | = 1983. PSF |
| T. AIRSPEED= 73.0 KT | TOTAL TEMP= | 272.2 DEG K | = 490.0 DEG R |
| A/C MACH NO= .114 | STATIC TEMP= | 271.5 DEG K | = 488.7 DEG R |
| BODY ALPHA= .7 DEG | DENSITY= | 1.22 KG/M3 | = .00237 SLUG/FT3 |
| BODY BETA= .7 DEG | DENSITY ALT= | 56. M | = 185. FT |
| | SONIC SPEED= | 330.9 M/SEC | = 1086. FPS |
| | RATE OF CLIMB= | -78. M/MIN | = -256. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 37.54 | 123.2 | -.011 | 37.52 | 123.1 | -.010 | ROLL | .3 | -.004 | -.018 |
| Y | .49 | 1.6 | .010 | .48 | 1.6 | .007 | PITCH | -1.3 | .012 | -.007 |
| Z | .46 | 1.5 | -1.014 | .46 | 1.5 | -1.014 | YAW | 279.4 | -.007 | -.037 |

CONTROL ANGLES

| | | | |
|---|---|---|---|
| M.R. COLL= | 7.1 DEG | HORIZ FIN= | 6.9 DEG |
| A1= | -.8 DEG | T.R. COLL= | 1.7 DEG |
| B1= | 4.1 DEG | PEDAL POS= | 1.2 DEG |

ROTOR PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| ADVANCE RATIO= | .164 | SHAFT ALPHA= | .7 DEG | PER CENT RPM= | 100.8 |
| HOVER TIP MACH= | .69 | CONTROL ALPHA= | -3.4 DEG | RN/MACH= | .162E+08 |
| TIP MAX-MACH= | .81 | DELTA PSI= | -.7 DEG | CLP= | .00395 |
| TIP MIN-MACH= | .58 | | | | |
| .9R MAX-MACH= | .74 | | | | |
| .9R MIN-MACH= | .51 | THRUST FACTOR= | .905E+07 N = .203E+07 LB | | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 35264. N LOADED CG X= 5.04 M = 198.6 IN
RUN NO. 5 7928. LB Y= -.00 = -.0
TIME 68322.00 (SEC) Z= 1.81 = 71.3

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 83.3 KT
A/C MACH NO= .130

BODY ALPHA= .0 DEG
BODY BETA= 1.8 DEG

DYNAMIC PRES= 1.12 KPA = 23.4 PSF
STATIC PRES= 95.0 KPA = 1983. PSF
TOTAL TEMP= 272.6 DEG K = 490.7 DEG R
STATIC TEMP= 271.7 DEG K = 489.0 DEG R

DENSITY= 1.22 KG/M3 = .00236 SLUG/FT3
DENSITY ALT= 62. M = 203. FT
SONIC SPEED= 331.0 M/SEC = 1086. FPS
RATE OF CLIMB= -61. M/MIN = -199. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 42.84 | 140.5 | -.016 | 42.83 | 140.5 | -.017 | ROLL | 3.9 | -.005 | .009 |
| Y | 1.32 | 4.3 | .003 | 1.31 | 4.3 | .005 | PITCH | -1.2 | .003 | .002 |
| Z | .02 | .1 | -1.004 | .02 | .1 | -1.004 | YAW | 298.3 | .013 | .010 |

CONTROL ANGLES M.R. COLL= 7.2 DEG HORIZ FIN= 7.3 DEG
A1= -.3 DEG T.R. COLL= 1.8 DEG
B1= 5.0 DEG PEDAL POS= 1.4 DEG

ROTOR PARAMETERS ADVANCE RATIO= .187 SHAFT ALPHA= .0 DEG PER CENT RPM= 101.0
HOVER TIP MACH= .69 CONTROL ALPHA= -4.9 DEG RN/MACH= .162E+08

TIP MAX-MACH= .82 DELTA PSI= -1.7 DEG CLP= .00390
TIP MIN-MACH= .57
.9R MAX-MACH= .75
.9R MIN-MACH= .50 THRUST FACTOR= .908E+07 N = .204E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 35219. N LOADED CG X= 5.04 M = 198.6 IN
RUN NO. 6 7918. LB Y= -.00 = -.0
TIME 68378.60 (SEC) Z= 1.81 = 71.4

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 90.3 KT
A/C MACH NO= .140

BODY ALPHA= -1.1 DEG
BODY BETA= 1.4 DEG

DYNAMIC PRES= 1.32 KPA = 27.5 PSF
STATIC PRES= 94.9 KPA = 1982. PSF
TOTAL TEMP= 272.6 DEG K = 490.7 DEG R
STATIC TEMP= 271.5 DEG K = 488.8 DEG R

DENSITY= 1.22 KG/M3 = .00236 SLUG/FT3
DENSITY ALT= 62. M = 204. FT
SONIC SPEED= 330.9 M/SEC = 1086. FPS
RATE OF CLIMB= -63. M/MIN = -205. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 46.43 | 152.3 | -.025 | 46.40 | 152.2 | -.022 | ROLL | .7 | -.004 | .047 |
| Y | 1.13 | 3.7 | .005 | 1.12 | 3.7 | .015 | PITCH | -2.4 | .012 | -.012 |
| Z | -.90 | -3.0 | -1.000 | -.90 | -3.0 | -1.000 | YAW | 320.7 | .014 | -.022 |

CONTROL ANGLES

M.R. COLL= 7.7 DEG HORIZ FIN= 7.6 DEG
A1= -.2 DEG T.R. COLL= 2.1 DEG
B1= 5.5 DEG PEDAL POS= 1.5 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .203 SHAFT ALPHA= -1.1 DEG PER CENT RPM= 100.6
HOVER TIP MACH= .69 CONTROL ALPHA= -6.6 DEG RN/MACH= .162E+08

TIP MAX-MACH= .83 DELTA PSI= -1.4 DEG CLP= .00390
TIP MIN-MACH= .55
.9R MAX-MACH= .76
.9R MIN-MACH= .48 THRUST FACTOR= .902E+07 N = .203E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 35186. N LOADED CG X= 5.04 M = 198.6 IN
RUN NO. 7 7911. LB Y= -.00 = -.0
TIME 68428.00 (SEC) Z= 1.81 = 71.4

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 1.60 KPA = 33.5 PSF
STATIC PRES= 94.9 KPA = 1983. PSF
T. AIRSPEED= 99.5 KT TOTAL TEMP= 272.9 DEG K = 491.2 DEG R
A/C MACH NO= .155 STATIC TEMP= 271.6 DEG K = 488.8 DEG R

BODY ALPHA= -.6 DEG DENSITY= 1.22 KG/M3 = .00236 SLUG/FT3
BODY BETA= 1.2 DEG DENSITY ALT= 60. M = 198. FT
SONIC SPEED= 330.9 M/SEC = 1080. FPS
RATE OF CLIMB= -55. M/MIN = -182. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 51.19 | 167.9 | -.031 | 51.17 | 167.9 | -.035 | ROLL | .7 | -.003 | -.022 |
| Y | 1.07 | 3.5 | .003 | 1.07 | 3.5 | -.001 | PITCH | -1.6 | .007 | .021 |
| Z | -.54 | -1.8 | -1.010 | -.54 | -1.8 | -1.009 | YAW | 326.7 | -.002 | -.014 |

CONTROL ANGLES M.R. COLL= 7.8 DEG HORIZ FIN= 8.1 DEG
A1= -.1 DEG T.R. COLL= 2.3 DEG
B1= 6.4 DEG PEDAL POS= 1.8 DEG

ROTOR PARAMETERS ADVANCE RATIO= .223 SHAFT ALPHA= -.6 DEG PER CENT RPM= 100.8
HOVER TIP MACH= .69 CONTROL ALPHA= -7.0 DEG RN/MACH= .162E+08

TIP MAX-MACH= .85 DELTA PSI= -1.2 DEG CLP= .00393
TIP MIN-MACH= .54
.9R MAX-MACH= .78
.9R MIN-MACH= .47 THRUST FACTOR= .905E+07 N = .203E+07 LB

NASA LANGLEY FLIGHT DATA   AH-1G   ----   PADS PCM DATA

```
FLIGHT NO. 011        AIRCRAFT TOTAL WT = 35148. N      LOADED CG X=  5.05 M = 198.6 IN
RUN NO.    8                              7902. LB                Y=  -.00   =   -.0
TIME 68475.20 (SEC)                                               Z=  1.81   =  71.4

AERODYNAMIC FLIGHT STATE            DYNAMIC PRES=  1.94 KPA    =   40.6  PSF
                                     STATIC PRES=  94.9 KPA    =  1982.  PSF
  T. AIRSPEED= 109.5 KT               TOTAL TEMP= 273.1 DEG K  =  491.7  DEG R
  A/C MACH NO=  .170                 STATIC TEMP= 271.6 DEG K  =  488.8  DEG R

   BODY ALPHA=   -.9 DEG                 DENSITY=  1.22 KG/M3  = .00236 SLUG/FT3
   BODY  BETA=   1.2 DEG             DENSITY ALT=   63. M      =   207. FT
                                     SONIC SPEED= 330.9 M/SEC  =  1086. FPS
                                   RATE OF CLIMB= -108. M/MIN  =  -353. FPM
```

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 56.33 | 184.8 | -.040 | 56.32 | 184.8 | -.036 | ROLL | .9 | -.004 | .025 |
| Y | 1.14 | 3.7 | -.000 | 1.13 | 3.7 | .005 | PITCH | -2.7 | .006 | -.018 |
| Z | -.91 | -3.0 | -1.007 | -.91 | -3.0 | -1.007 | YAW | 329.4 | .001 | -.009 |

```
CONTROL ANGLES         M.R. COLL=   8.2 DEG      HORIZ FIN=   8.6 DEG
                              A1=   -.0 DEG      T.R. COLL=   2.6 DEG
                              B1=   7.2 DEG      PEDAL POS=   2.2 DEG

ROTOR PARAMETERS     ADVANCE RATIO= .246      SHAFT ALPHA=   -.9 DEG    PER CENT RPM= 100.7
                    HOVER TIP MACH= .69     CONTROL ALPHA=  -8.1 DEG        RN/MACH= .162E+08

                      TIP MAX-MACH= .86        DELTA PSI=  -1.1 DEG            CLP= .00391
                      TIP MIN-MACH= .52
                      .9R MAX-MACH= .79
                      .9R MIN-MACH= .45     THRUST FACTOR=  .904E+07 N  =  .203E+07 LB
```

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 35121. N LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 9 7896. LB Y= -.00 = -.0
TIME 68534.80 (SEC) Z= 1.81 = 71.4

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 118.3 KT
A/C MACH NO= .184

BODY ALPHA= -2.3 DEG
BODY BETA= 1.3 DEG

DYNAMIC PRES= 2.27 KPA = 47.4 PSF
STATIC PRES= 94.9 KPA = 1983. PSF
TOTAL TEMP= 273.6 DEG K = 492.4 DEG R
STATIC TEMP= 271.7 DEG K = 489.1 DEG R
DENSITY= 1.22 KG/M3 = .00236 SLUG/FT3
DENSITY ALT= 65. M = 214. FT
SONIC SPEED= 331.0 M/SEC = 1086. FPS
RATE OF CLIMB= -86. M/MIN = -282. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 60.79 | 199.5 | -.051 | 60.79 | 199.4 | -.053 | ROLL | .3 | -.022 | -.064 |
| Y | 1.38 | 4.5 | .002 | 1.34 | 4.4 | -.012 | PITCH | -3.6 | .003 | .010 |
| Z | -2.43 | -8.0 | -.995 | -2.43 | -8.0 | -.995 | YAW | 329.0 | -.003 | -.008 |

CONTROL ANGLES

M.R. COLL= 8.9 DEG HORIZ FIN= 9.0 DEG
A1= -.0 DEG T.R. COLL= 3.0 DEG
B1= 7.8 DEG PEDAL POS= 2.7 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .266 SHAFT ALPHA= -2.3 DEG PER CENT RPM= 100.5
HOVER TIP MACH= .69 CONTROL ALPHA= -10.1 DEG RN/MACH= .162E+08

TIP MAX-MACH= .88 DELTA PSI= -1.3 DEG CLP= .00389
TIP MIN-MACH= .51
.9R MAX-MACH= .81
.9R MIN-MACH= .44 THRUST FACTOR= .899E+07 N = .202E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 35037. N LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 10 7877. LB Y= -.00 = -.0
TIME 68616.00 (SEC) Z= 1.81 = 71.4

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 128.6 KT
A/C MACH NO= .200

BODY ALPHA= -2.9 DEG
BODY BETA= 1.5 DEG

DYNAMIC PRES= 2.69 KPA = 56.1 PSF
STATIC PRES= 95.0 KPA = 1984. PSF
TOTAL TEMP= 273.8 DEG K = 492.8 DEG R
STATIC TEMP= 271.6 DEG K = 488.9 DEG R

DENSITY= 1.22 KG/M3 = .00237 SLUG/FT3
DENSITY ALT= 55. M = 180. FT
SONIC SPEED= 330.9 M/SEC = 1086. FPS
RATE OF CLIMB= -72. M/MIN = -238. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 66.04 | 216.7 | -.063 | 66.02 | 216.6 | -.053 | ROLL | -.4 | -.002 | -.024 |
| Y | 1.77 | 5.8 | -.002 | 1.77 | 5.8 | -.007 | PITCH | -4.0 | .009 | -.046 |
| Z | -3.40 | -11.2 | -.986 | -3.40 | -11.2 | -.986 | YAW | 329.0 | .006 | -.018 |

CONTROL ANGLES

M.R. COLL= 9.6 DEG HORIZ FIN= 9.7 DEG
A1= .0 DEG T.R. COLL= 3.3 DEG
B1= 8.8 DEG PEDAL POS= 2.9 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .288 SHAFT ALPHA= -2.9 DEG PER CENT RPM= 100.9
HOVER TIP MACH= .69 CONTROL ALPHA= -11.7 DEG RN/MACH= .162E+08

TIP MAX-MACH= .89 DELTA PSI= -1.5 DEG CLP= .00380
TIP MIN-MACH= .49
.9R MAX-MACH= .83
.9R MIN-MACH= .42 THRUST FACTOR= .908E+07 N = .204E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34986. N LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 11 7866. LB Y= -.00 = -.0
TIME 68679.00 (SEC) Z= 1.81 = 71.4

AERODYNAMIC FLIGHT STATE

| | | |
|---|---|---|
| | DYNAMIC PRES= 3.03 KPA | = 63.2 PSF |
| | STATIC PRES= 95.0 KPA | = 1985. PSF |
| T. AIRSPEED= 136.4 KT | TOTAL TEMP= 274.0 DEG K | = 493.2 DEG R |
| A/C MACH NO= .212 | STATIC TEMP= 271.6 DEG K | = 488.8 DEG R |
| BODY ALPHA= -3.9 DEG | DENSITY= 1.22 KG/M3 | = .00237 SLUG/FT3 |
| BODY BETA= .9 DEG | DENSITY ALT= 49. M | = 161. FT |
| | SONIC SPEED= 330.9 M/SEC | = 1086. FPS |
| | RATE OF CLIMB= -32. M/MIN | = -106. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 69.99 | 229.6 | -.077 | 69.96 | 229.5 | -.078 | ROLL | .7 | .003 | .036 |
| Y | 1.07 | 3.5 | .004 | 1.08 | 3.5 | .012 | PITCH | -4.3 | .012 | .006 |
| Z | -4.72 | -15.5 | -.991 | -4.72 | -15.5 | -.991 | YAW | 332.7 | .006 | .044 |

CONTROL ANGLES

| | |
|---|---|
| M.R. COLL= 10.2 DEG | HORIZ FIN= 10.1 DEG |
| A1= .0 DEG | T.R. COLL= 3.6 DEG |
| B1= 9.3 DEG | PEDAL POS= 3.3 DEG |

ROTOR PARAMETERS

| | | |
|---|---|---|
| ADVANCE RATIO= .306 | SHAFT ALPHA= -3.9 DEG | PER CENT RPM= 100.8 |
| HOVER TIP MACH= .69 | CONTROL ALPHA= -13.2 DEG | RN/MACH= .162E+08 |
| TIP MAX-MACH= .91 | DELTA PSI= -.9 DEG | CLP= .00383 |
| TIP MIN-MACH= .48 | | |
| .9R MAX-MACH= .84 | | |
| .9R MIN-MACH= .41 | THRUST FACTOR= .905E+07 N = .204E+07 LB | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34903. N LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 12 7847. LB Y= -.00 = -.0
TIME 68794.60 (SEC) Z= 1.81 = 71.4

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 3.47 KPA = 72.4 PSF
STATIC PRES= 95.0 KPA = 1984. PSF

T. AIRSPEED= 145.9 KT
A/C MACH NO= .227

TOTAL TEMP= 274.5 DEG K = 494.1 DEG R
STATIC TEMP= 271.7 DEG K = 489.1 DEG R

BODY ALPHA= -4.6 DEG
BODY BETA= 1.2 DEG

DENSITY= 1.22 KG/M3 = .00236 SLUG/FT3
DENSITY ALT= 59. M = 194. FT
SONIC SPEED= 331.0 M/SEC = 1086. FPS
RATE OF CLIMB= -171. M/MIN = -560. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 74.80 | 245.4 | -.091 | 74.79 | 245.4 | -.086 | ROLL | 1.7 | .006 | .004 |
| Y | 1.54 | 5.0 | -.010 | 1.55 | 5.1 | -.009 | PITCH | -6.7 | .006 | -.021 |
| Z | -6.01 | -19.7 | -1.015 | -6.01 | -19.7 | -1.015 | YAW | 152.7 | -.001 | -.010 |

CONTROL ANGLES

M.R. COLL= 11.3 DEG HORIZ FIN= 10.9 DEG
A1= -.2 DEG T.R. COLL= 4.3 DEG
B1= 10.2 DEG PEDAL POS= 4.2 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .327 SHAFT ALPHA= -4.6 DEG PER CENT RPM= 101.0
HOVER TIP MACH= .69 CONTROL ALPHA= -14.8 DEG RN/MACH= .162E+08

TIP MAX-MACH= .92 DELTA PSI= -1.2 DEG CLP= .00389
TIP MIN-MACH= .47
.9R MAX-MACH= .85
.9R MIN-MACH= .40 THRUST FACTOR= .909E+07 N = .204E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34868. N LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 13 7839. LB Y= -.00 = -.0
TIME 68838.50 (SEC) Z= 1.81 = 71.4

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 3.80 KPA = 79.3 PSF
STATIC PRES= 95.0 KPA = 1985. PSF
T. AIRSPEED= 152.5 KT TOTAL TEMP= 274.9 DEG K = 494.8 DEG R
A/C MACH NO= .237 STATIC TEMP= 271.8 DEG K = 489.3 DEG R

BODY ALPHA= -6.0 DEG DENSITY= 1.22 KG/M3 = .00236 SLUG/FT3
BODY BETA= .3 DEG DENSITY ALT= 58. M = 189. FT
SONIC SPEED= 331.1 M/SEC = 1086. FPS
RATE OF CLIMB= -42. M/MIN = -139. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 78.05 | 256.1 | -.104 | 78.02 | 256.0 | -.107 | ROLL | 3.7 | .025 | .059 |
| Y | .40 | 1.3 | .015 | .45 | 1.5 | .027 | PITCH | -6.5 | .015 | .012 |
| Z | -8.19 | -26.9 | -.999 | -8.18 | -26.9 | -.999 | YAW | 161.4 | .004 | -.060 |

CONTROL ANGLES M.R. COLL= 12.1 DEG HORIZ FIN= 11.2 DEG
A1= -.8 DEG T.R. COLL= 4.5 DEG
B1= 10.5 DEG PEDAL POS= 4.2 DEG

ROTOR PARAMETERS ADVANCE RATIO= .342 SHAFT ALPHA= -6.0 DEG PER CENT RPM= 101.0
HOVER TIP MACH= .69 CONTROL ALPHA= -16.5 DEG RN/MACH= .162E+08

TIP MAX-MACH= .93 DELTA PSI= -.3 DEG CLP= .00383
TIP MIN-MACH= .46
.9R MAX-MACH= .86
.9R MIN-MACH= .39 THRUST FACTOR= .909E+07 N = .204E+07 LB

NASA LANGLEY FLIGHT DATA   AH-1G  ----  PADS PCM DATA

FLIGHT NO. 011    AIRCRAFT TOTAL WT = 34741. N    LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 14    7811. LB    Y= -.00 = -.0
TIME 69033.80 (SEC)    Z= 1.81 = 71.4

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= .41 KPA = 8.6 PSF
STATIC PRES= 98.5 KPA = 2057. PSF
TOTAL TEMP= 274.3 DEG K = 493.8 DEG R
STATIC TEMP= 274.0 DEG K = 493.2 DEG R

T. AIRSPEED= 49.9 KT
A/C MACH NO= .077

BODY ALPHA= -.0 DEG
BODY BETA= 7.4 DEG

DENSITY= 1.25 KG/M3 = .00243 SLUG/FT3
DENSITY ALT= -229. M = -752. FT
SONIC SPEED= 332.4 M/SEC = 1091. FPS
RATE OF CLIMB= -46. M/MIN = -152. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 25.45 | 83.5 | .010 | 25.44 | 83.5 | .011 | ROLL | 1.4 | .004 | -.002 |
| Y | 3.27 | 10.7 | -.005 | 3.28 | 10.8 | -.006 | PITCH | -1.6 | .006 | -.005 |
| Z | -.01 | -.0 | -.997 | -.01 | -.0 | -.997 | YAW | 156.3 | .004 | .030 |

CONTROL ANGLES

M.R. COLL= 7.1 DEG    HORIZ FIN= 6.6 DEG
A1= -1.1 DEG    T.R. COLL= 3.4 DEG
B1= 3.3 DEG    PEDAL POS= 3.0 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .112    SHAFT ALPHA= -.0 DEG    PER CENT RPM= 101.0
HOVER TIP MACH= .69    CONTROL ALPHA= -3.3 DEG    RN/MACH= .161E+08

TIP MAX-MACH= .77    DELTA PSI= -7.3 DEG    CLP= .00371
TIP MIN-MACH= .61
.9R MAX-MACH= .70
.9R MIN-MACH= .55    THRUST FACTOR= .934E+07 N = .210E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34697. N LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 15 7801. LB Y= -.00 = -.0
TIME 69103.50 (SEC) Z= 1.81 = 71.5

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 58.7 KT
A/C MACH NO= .091

BODY ALPHA= 1.5 DEG
BODY BETA= 9.0 DEG

DYNAMIC PRES= .57 KPA = 11.9 PSF
STATIC PRES= 98.5 KPA = 2058. PSF
TOTAL TEMP= 274.9 DEG K = 494.8 DEG R
STATIC TEMP= 274.4 DEG K = 494.0 DEG R

DENSITY= 1.25 KG/M3 = .00243 SLUG/FT3
DENSITY ALT= -217. M = -712. FT
SONIC SPEED= 332.6 M/SEC = 1091. FPS
RATE OF CLIMB= -95. M/MIN = -313. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 29.82 | 97.8 | .004 | 29.80 | 97.8 | .000 | ROLL | .4 | -.014 | -.010 |
| Y | 4.65 | 15.3 | -.012 | 4.62 | 15.2 | -.014 | PITCH | -1.5 | .011 | .018 |
| Z | .80 | 2.6 | -.999 | .80 | 2.6 | -.999 | YAW | 151.0 | .003 | .040 |

CONTROL ANGLES

M.R. COLL= 6.5 DEG HORIZ FIN= 6.7 DEG
A1= -.5 DEG T.R. COLL= 2.6 DEG
B1= 3.5 DEG PEDAL POS= 2.2 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .132 SHAFT ALPHA= 1.5 DEG PER CENT RPM= 100.9
HOVER TIP MACH= .69 CONTROL ALPHA= -2.0 DEG RN/MACH= .160E+08

TIP MAX-MACH= .78 DELTA PSI= -8.8 DEG CLP= .00372
TIP MIN-MACH= .60
.9R MAX-MACH= .71
.9R MIN-MACH= .53 THRUST FACTOR= .932E+07 N = .209E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34641. N LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 16 7788. LB Y= -.00 = -.0
TIME 69179.20 (SEC) Z= 1.82 = 71.5

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 64.1 KT
A/C MACH NO= .099

BODY ALPHA= -.8 DEG
BODY BETA= 4.9 DEG

DYNAMIC PRES= .68 KPA = 14.3 PSF
STATIC PRES= 98.7 KPA = 2061. PSF
TOTAL TEMP= 274.8 DEG K = 494.7 DEG R
STATIC TEMP= 274.3 DEG K = 493.7 DEG R

DENSITY= 1.25 KG/M3 = .00243 SLUG/FT3
DENSITY ALT= -239. M = -784. FT
SONIC SPEED= 332.6 M/SEC = 1091. FPS
RATE OF CLIMB= -3. M/MIN = -10. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 32.87 | 107.8 | -.001 | 32.86 | 107.8 | -.001 | ROLL | 1.4 | -.005 | .015 |
| Y | 2.81 | 9.2 | -.007 | 2.80 | 9.2 | -.004 | PITCH | -.7 | .005 | -.002 |
| Z | -.44 | -1.4 | -.992 | -.44 | -1.4 | -.992 | YAW | 136.5 | .014 | .014 |

CONTROL ANGLES

M.R. COLL= 6.9 DEG HORIZ FIN= 6.9 DEG
A1= -.5 DEG T.R. COLL= 2.1 DEG
B1= 3.9 DEG PEDAL POS= 1.5 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .144 SHAFT ALPHA= -.8 DEG PER CENT RPM= 100.9
HOVER TIP MACH= .69 CONTROL ALPHA= -4.7 DEG RN/MACH= .160E+08

TIP MAX-MACH= .79 DELTA PSI= -4.9 DEG CLP= .00368
TIP MIN-MACH= .59
.9R MAX-MACH= .72
.9R MIN-MACH= .52 THRUST FACTOR= .933E+07 N = .210E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34597. N LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 17 7778. LB Y= -.00 = -.0
TIME 69249.40 (SEC) Z= 1.82 = 71.5

AERODYNAMIC FLIGHT STATE

| | | | |
|---|---|---|---|
| | | DYNAMIC PRES= .91 KPA | = 19.0 PSF |
| | | STATIC PRES= 98.8 KPA | = 2063. PSF |
| T. AIRSPEED= | 74.1 KT | TOTAL TEMP= 275.1 DEG K | = 495.2 DEG R |
| A/C MACH NO= | .115 | STATIC TEMP= 274.4 DEG K | = 493.9 DEG R |
| BODY ALPHA= | -.3 DEG | DENSITY= 1.26 KG/M3 | = .00244 SLUG/FT3 |
| BODY BETA= | 5.7 DEG | DENSITY ALT= -248. M | = -814. FT |
| | | SONIC SPEED= 332.6 M/SEC | = 1091. FPS |
| | | RATE OF CLIMB= -92. M/MIN | = -302. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 37.92 | 124.4 | -.009 | 37.90 | 124.3 | -.017 | ROLL | 1.1 | -.005 | -.028 |
| Y | 3.75 | 12.3 | -.023 | 3.74 | 12.3 | -.029 | PITCH | -2.5 | .008 | .037 |
| Z | -.21 | -.7 | -.998 | -.21 | -.7 | -.998 | YAW | 137.5 | -.005 | -.008 |

CONTROL ANGLES

| | | | |
|---|---|---|---|
| M.R. COLL= | 6.8 DEG | HORIZ FIN= | 7.1 DEG |
| A1= | -.2 DEG | T.R. COLL= | 2.5 DEG |
| B1= | 4.4 DEG | PEDAL POS= | 2.0 DEG |

ROTOR PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| ADVANCE RATIO= | .166 | SHAFT ALPHA= | -.3 DEG | PER CENT RPM= | 100.8 |
| HOVER TIP MACH= | .69 | CONTROL ALPHA= | -4.7 DEG | RN/MACH= | .160E+08 |
| TIP MAX-MACH= | .80 | DELTA PSI= | -5.6 DEG | CLP= | .00371 |
| TIP MIN-MACH= | .58 | | | | |
| .9R MAX-MACH= | .74 | | | | |
| .9R MIN-MACH= | .51 | THRUST FACTOR= | .932E+07 N = .210E+07 LB | | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34552. N LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 18 7768. LB Y= -.00 = -.0
TIME 69319.75 (SEC) Z= 1.82 = 71.5

AERODYNAMIC FLIGHT STATE

| | | | | |
|---|---|---|---|---|
| DYNAMIC PRES= | 1.11 KPA | = | 23.2 | PSF |
| STATIC PRES= | 98.7 KPA | = | 2062. | PSF |
| TOTAL TEMP= | 275.3 DEG K | = | 495.5 | DEG R |
| STATIC TEMP= | 274.4 DEG K | = | 494.0 | DEG R |
| DENSITY= | 1.25 KG/M3 | = | .00243 | SLUG/FT3 |
| DENSITY ALT= | -241. M | = | -790. | FT |
| SONIC SPEED= | 332.6 M/SEC | = | 1091. | FPS |
| RATE OF CLIMB= | -86. M/MIN | = | -282. | FPM |

T. AIRSPEED= 81.8 KT
A/C MACH NO= .127

BODY ALPHA= .3 DEG
BODY BETA= 1.8 DEG

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 42.05 | 138.0 | -.014 | 42.03 | 137.9 | -.019 | ROLL | 1.0 | -.002 | -.021 |
| Y | 1.29 | 4.2 | -.003 | 1.29 | 4.2 | -.007 | PITCH | -1.6 | .007 | .024 |
| Z | .22 | .7 | -1.008 | .22 | .7 | -1.008 | YAW | 139.6 | .007 | -.034 |

CONTROL ANGLES

| | | | |
|---|---|---|---|
| M.R. COLL= | 6.8 DEG | HORIZ FIN= | 7.3 DEG |
| A1= | -.2 DEG | T.R. COLL= | 2.0 DEG |
| B1= | 4.8 DEG | PEDAL POS= | 1.5 DEG |

ROTOR PARAMETERS

ADVANCE RATIO= .183 SHAFT ALPHA= .3 DEG PER CENT RPM= 100.9
HOVER TIP MACH= .69 CONTROL ALPHA= -4.5 DEG RN/MACH= .160E+08

TIP MAX-MACH= .82 DELTA PSI= -1.8 DEG CLP= .00373
TIP MIN-MACH= .56
.9R MAX-MACH= .75
.9R MIN-MACH= .49 THRUST FACTOR= .934E+07 N = .210E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34525. N LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 19 7762. LB Y= -.00 = -.0
TIME 69376.50 (SEC) Z= 1.82 = 71.5

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 89.8 KT
A/C MACH NO= .139

BODY ALPHA= -1.3 DEG
BODY BETA= 1.7 DEG

DYNAMIC PRES= 1.34 KPA = 28.0 PSF
STATIC PRES= 98.9 KPA = 2065. PSF
TOTAL TEMP= 275.8 DEG K = 496.4 DEG R
STATIC TEMP= 274.7 DEG K = 494.5 DEG R

DENSITY= 1.25 KG/M3 = .00243 SLUG/FT3
DENSITY ALT= -246. M = -808. FT
SONIC SPEED= 332.8 M/SEC = 1092. FPS
RATE OF CLIMB= -90. M/MIN = -295. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 46.17 | 151.5 | -.024 | 46.14 | 151.4 | -.023 | ROLL | .7 | -.008 | -.050 |
| Y | 1.41 | 4.6 | -.006 | 1.39 | 4.6 | -.017 | PITCH | -3.1 | .012 | -.005 |
| Z | -1.01 | -3.3 | -.988 | -1.01 | -3.3 | -.988 | YAW | 145.4 | .013 | .065 |

CONTROL ANGLES

M.R. COLL= 7.4 DEG HORIZ FIN= 7.7 DEG
A1= -.3 DEG T.R. COLL= 2.3 DEG
B1= 5.6 DEG PEDAL POS= 1.5 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .201 SHAFT ALPHA= -1.3 DEG PER CENT RPM= 100.9
HOVER TIP MACH= .69 CONTROL ALPHA= -6.8 DEG RN/MACH= .160E+08

TIP MAX-MACH= .83 DELTA PSI= -1.7 DEG CLP= .00365
TIP MIN-MACH= .55
.9R MAX-MACH= .76
.9R MIN-MACH= .48 THRUST FACTOR= .935E+07 N = .210E+07 LB

NASA LANGLEY FLIGHT DATA   AH-1G   ----   PADS PCM DATA

```
FLIGHT NO. 011        AIRCRAFT TOTAL WT = 34483. N      LOADED CG X=  5.05 M = 198.9 IN
RUN NO.    20                             7753. LB                Y=  -.00   =   -.0
TIME 69446.00 (SEC)                                               Z=  1.82   =  71.5

AERODYNAMIC FLIGHT STATE           DYNAMIC PRES=  1.62 KPA    =   33.7  PSF
                                    STATIC PRES=  98.8 KPA    =  2063.  PSF
  T. AIRSPEED=  98.5 KT              TOTAL TEMP= 275.9 DEG K =  496.7  DEG R
  A/C MACH NO=  .152                STATIC TEMP= 274.6 DEG K =  494.4  DEG R

   BODY ALPHA=   -.9 DEG               DENSITY=  1.25 KG/M3 = .00243 SLUG/FT3
   BODY  BETA=   2.0 DEG            DENSITY ALT= -234. M      =  -769. FT
                                    SONIC SPEED= 332.8 M/SEC =  1092. FPS
                                  RATE OF CLIMB=  -70. M/MIN =  -229. FPM

INERTIAL FLIGHT STATE

  AXIS  CG LIN VEL   CG LIN ACC  HUB LIN VEL  HUB LIN ACC   AXIS   ANG POS  ANG RATES    ANG ACC
       (M/S)  (FPS)     (G)      (M/S)  (FPS)     (G)              (DEG)   (RAD/SEC)   (RAD/SEC2)

   X   50.65  166.2    -.029     50.64  166.1    -.027      ROLL       .7    -.008         .002
   Y    1.80    5.9    -.002      1.78    5.8    -.001      PITCH    -2.2     .005        -.005
   Z    -.79   -2.6    -.996      -.79   -2.6    -.996      YAW     152.7     .017        -.009

CONTROL ANGLES        M.R. COLL=   7.5 DEG     HORIZ FIN=   8.1 DEG
                             A1=    .1 DEG     T.R. COLL=   2.4 DEG
                             B1=   6.3 DEG     PEDAL POS=   1.8 DEG

ROTOR PARAMETERS     ADVANCE RATIO= .221      SHAFT ALPHA=    -.9 DEG    PER CENT RPM= 101.0
                   HOVER TIP MACH= .69     CONTROL ALPHA=  -7.2 DEG        RN/MACH= .160E+08

                     TIP MAX-MACH= .84        DELTA PSI=  -2.0 DEG              CLP= .00368
                     TIP MIN-MACH= .54
                     .9R MAX-MACH= .77
                     .9R MIN-MACH= .47     THRUST FACTOR=  .934E+07 N  =  .210E+07 LB
```

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34441. N LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 21 7743. LB Y= -.00 = -.0
TIME 69511.50 (SEC) Z= 1.82 = 71.5

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 1.90 KPA = 39.7 PSF
STATIC PRES= 98.7 KPA = 2061. PSF
T. AIRSPEED= 106.8 KT TOTAL TEMP= 276.1 DEG K = 497.0 DEG R
A/C MACH NO= .165 STATIC TEMP= 274.6 DEG K = 494.3 DEG R

BODY ALPHA= -1.3 DEG DENSITY= 1.25 KG/M3 = .00243 SLUG/FT3
BODY BETA= 1.5 DEG DENSITY ALT= -228. M = -749. FT
SONIC SPEED= 332.8 M/SEC = 1092. FPS
RATE OF CLIMB= -68. M/MIN = -223. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 54.93 | 180.2 | -.040 | 54.90 | 180.1 | -.042 | ROLL | 1.1 | -.020 | -.013 |
| Y | 1.41 | 4.6 | -.005 | 1.37 | 4.5 | -.007 | PITCH | -2.5 | .012 | .010 |
| Z | -1.25 | -4.1 | -1.016 | -1.25 | -4.1 | -1.016 | YAW | 169.6 | -.003 | .042 |

CONTROL ANGLES M.R. COLL= 8.0 DEG HORIZ FIN= 8.4 DEG
A1= .0 DEG T.R. COLL= 2.4 DEG
B1= 6.9 DEG PEDAL POS= 2.1 DEG

ROTOR PARAMETERS ADVANCE RATIO= .240 SHAFT ALPHA= -1.3 DEG PER CENT RPM= 100.8
HOVER TIP MACH= .69 CONTROL ALPHA= -8.2 DEG RN/MACH= .160E+08

TIP MAX-MACH= .85 DELTA PSI= -1.4 DEG CLP= .00376
TIP MIN-MACH= .52
.9R MAX-MACH= .79
.9R MIN-MACH= .46 THRUST FACTOR= .931E+07 N = .209E+07 LB

NASA LANGLEY FLIGHT DATA   AH-1G  ----   PADS PCM DATA

FLIGHT NO. 011   AIRCRAFT TOTAL WT = 34408. N   LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 22   7736. LB   Y= -.00 = -.0
TIME 69564.00 (SEC)   Z= 1.82 = 71.5

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 2.28 KPA = 47.5 PSF
STATIC PRES= 98.8 KPA = 2063. PSF
T. AIRSPEED= 116.8 KT   TOTAL TEMP= 276.3 DEG K = 497.4 DEG R
A/C MACH NO= .181   STATIC TEMP= 274.5 DEG K = 494.2 DEG R

BODY ALPHA= -2.3 DEG   DENSITY= 1.25 KG/M3 = .00243 SLUG/FT3
BODY BETA= 1.9 DEG   DENSITY ALT= -239. M = -785. FT
SONIC SPEED= 332.7 M/SEC = 1092. FPS
RATE OF CLIMB= -54. M/MIN = -177. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 60.00 | 196.8 | -.054 | 59.98 | 196.8 | -.055 | ROLL | .7 | -.010 | .020 |
| Y | 1.95 | 6.4 | -.006 | 1.93 | 6.3 | -.002 | PITCH | -3.1 | .007 | .005 |
| Z | -2.39 | -7.8 | -1.015 | -2.39 | -7.8 | -1.015 | YAW | 179.2 | .011 | .001 |

CONTROL ANGLES   M.R. COLL= 8.6 DEG   HORIZ FIN= 9.0 DEG
A1= .3 DEG   T.R. COLL= 2.9 DEG
B1= 7.7 DEG   PEDAL POS= 2.5 DEG

ROTOR PARAMETERS   ADVANCE RATIO= .262   SHAFT ALPHA= -2.3 DEG   PER CENT RPM= 100.7
HOVER TIP MACH= .69   CONTROL ALPHA= -10.0 DEG   RN/MACH= .160E+08

TIP MAX-MACH= .87   DELTA PSI= -1.8 DEG   CLP= .00375
TIP MIN-MACH= .51
.9R MAX-MACH= .80
.9R MIN-MACH= .44   THRUST FACTOR= .931E+07 N = .209E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34370. N LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 23 7727. LB Y= -.00 = -.0
TIME 69637.00 (SEC) Z= 1.82 = 71.5

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 125.7 KT
A/C MACH NO= .195

BODY ALPHA= -3.8 DEG
BODY BETA= 1.4 DEG

DYNAMIC PRES= 2.64 KPA = 55.1 PSF
STATIC PRES= 98.6 KPA = 2060. PSF
TOTAL TEMP= 276.6 DEG K = 497.9 DEG R
STATIC TEMP= 274.5 DEG K = 494.2 DEG R

DENSITY= 1.25 KG/M3 = .00243 SLUG/FT3
DENSITY ALT= -223. M = -731. FT
SONIC SPEED= 332.7 M/SEC = 1092. FPS
RATE OF CLIMB= -78. M/MIN = -255. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 64.52 | 211.7 | -.067 | 64.50 | 211.6 | -.074 | ROLL | 2.4 | .028 | -.084 |
| Y | 1.61 | 5.3 | .003 | 1.67 | 5.5 | -.015 | PITCH | -4.9 | .014 | .037 |
| Z | -4.32 | -14.2 | -1.015 | -4.32 | -14.2 | -1.015 | YAW | 34.1 | .001 | -.065 |

CONTROL ANGLES
M.R. COLL= 9.6 DEG HORIZ FIN= 9.4 DEG
A1= -.2 DEG T.R. COLL= 3.5 DEG
B1= 8.4 DEG PEDAL POS= 3.0 DEG

ROTOR PARAMETERS
ADVANCE RATIO= .282 SHAFT ALPHA= -3.8 DEG PER CENT RPM= 100.9
HOVER TIP MACH= .69 CONTROL ALPHA= -12.2 DEG RN/MACH= .160E+08

TIP MAX-MACH= .88 DELTA PSI= -1.5 DEG CLP= .00375
TIP MIN-MACH= .50
.9R MAX-MACH= .82
.9R MIN-MACH= .43 THRUST FACTOR= .931E+07 N = .209E+07 LB

NASA LANGLEY FLIGHT DATA    AH-1G  ----   PADS PCM DATA

FLIGHT NO. 011        AIRCRAFT TOTAL WT = 34352. N      LOADED CG X= 5.05 M = 198.9 IN
RUN NO.    24                            7723. LB                Y= -.00   =  -.0
TIME 69684.50 (SEC)                                              Z= 1.82   =  71.5

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 135.2 KT
A/C MACH NO= .209

BODY ALPHA= -4.4 DEG
BODY BETA= 1.8 DEG

DYNAMIC PRES= 3.05 KPA = 63.8 PSF
STATIC PRES= 98.6 KPA = 2060. PSF
TOTAL TEMP= 277.1 DEG K = 498.7 DEG R
STATIC TEMP= 274.6 DEG K = 494.4 DEG R

DENSITY= 1.25 KG/M3 = .00243 SLUG/FT3
DENSITY ALT= -222. M = -728. FT
SONIC SPEED= 332.8 M/SEC = 1092. FPS
RATE OF CLIMB= -54. M/MIN = -177. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 69.32 | 227.4 | -.079 | 69.31 | 227.4 | -.080 | ROLL | 1.6 | -.016 | .058 |
| Y | 2.21 | 7.3 | -.015 | 2.18 | 7.1 | -.003 | PITCH | -5.1 | .006 | .006 |
| Z | -5.35 | -17.6 | -.996 | -5.35 | -17.6 | -.996 | YAW | 36.3 | .000 | .070 |

CONTROL ANGLES

M.R. COLL= 10.3 DEG    HORIZ FIN= 10.2 DEG
A1= .2 DEG    T.R. COLL= 3.4 DEG
B1= 9.4 DEG    PEDAL POS= 3.2 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .303    SHAFT ALPHA= -4.4 DEG    PER CENT RPM= 101.0
HOVER TIP MACH= .69    CONTROL ALPHA= -13.8 DEG    RN/MACH= .160E+08

TIP MAX-MACH= .90    DELTA PSI= -1.8 DEG    CLP= .00367
TIP MIN-MACH= .48
.9R MAX-MACH= .83
.9R MIN-MACH= .41    THRUST FACTOR= .933E+07 N = .210E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 34296. N LOADED CG X= 5.05 M = 198.9 IN
RUN NO. 25 7711. LB Y= -.00 = -.0
TIME 69744.80 (SEC) Z= 1.82 = 71.6

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 3.67 KPA = 76.7 PSF
STATIC PRES= 98.7 KPA = 2062. PSF
T. AIRSPEED= 148.0 KT TOTAL TEMP= 277.1 DEG K = 498.9 DEG R
A/C MACH NO= .229 STATIC TEMP= 274.3 DEG K = 493.7 DEG R

BODY ALPHA= -5.6 DEG DENSITY= 1.25 KG/M3 = .00243 SLUG/FT3
BODY BETA= 1.9 DEG DENSITY ALT= -246. M = -808. FT
SONIC SPEED= 332.5 M/SEC = 1091. FPS
RATE OF CLIMB= -60. M/MIN = -196. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 75.71 | 248.4 | -.104 | 75.69 | 248.3 | -.107 | ROLL | -.1 | .022 | .235 |
| Y | 2.49 | 8.2 | .012 | 2.53 | 8.3 | .062 | PITCH | -6.4 | .009 | .016 |
| Z | -7.45 | -24.4 | -1.017 | -7.45 | -24.4 | -1.017 | YAW | 48.8 | .038 | -.147 |

CONTROL ANGLES M.R. COLL= 11.3 DEG HORIZ FIN= 10.7 DEG
A1= .5 DEG T.R. COLL= 4.2 DEG
B1= 10.0 DEG PEDAL POS= 3.6 DEG

ROTOR PARAMETERS ADVANCE RATIO= .332 SHAFT ALPHA= -5.6 DEG PER CENT RPM= 100.8
HOVER TIP MACH= .69 CONTROL ALPHA= -15.7 DEG RN/MACH= .160E+08

TIP MAX-MACH= .92 DELTA PSI= -1.9 DEG CLP= .00374
TIP MIN-MACH= .46
.9R MAX-MACH= .85
.9R MIN-MACH= .39 THRUST FACTOR= .932E+07 N = .209E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 33974. N LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 26 7638. LB Y= -.00 = -.0
TIME 70109.60 (SEC) Z= 1.82 = 71.7

AERODYNAMIC FLIGHT STATE

| | | | |
|---|---|---|---|
| T. AIRSPEED= 51.4 KT | DYNAMIC PRES= .44 KPA | = | 9.2 PSF |
| A/C MACH NO= .079 | STATIC PRES= 100.1 KPA | = | 2091. PSF |
| | TOTAL TEMP= 276.2 DEG K | = | 497.1 DEG R |
| | STATIC TEMP= 275.8 DEG K | = | 496.5 DEG R |
| BODY ALPHA= 1.0 DEG | DENSITY= 1.27 KG/M3 | = | .00245 SLUG/FT3 |
| BODY BETA= 9.2 DEG | DENSITY ALT= -332. M | = | -1090. FT |
| | SONIC SPEED= 333.5 M/SEC | = | 1094. FPS |
| | RATE OF CLIMB= -29. M/MIN | = | -97. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 26.13 | 85.7 | .008 | 26.11 | 85.7 | .007 | ROLL | -.7 | .004 | .022 |
| Y | 4.19 | 13.7 | -.005 | 4.20 | 13.8 | .000 | PITCH | -.2 | .009 | .002 |
| Z | .46 | 1.5 | -.999 | .46 | 1.5 | -.999 | YAW | 280.0 | .002 | -.013 |

CONTROL ANGLES

| | |
|---|---|
| M.R. COLL= 6.7 DEG | HORIZ FIN= 6.6 DEG |
| A1= -.8 DEG | T.R. COLL= 3.2 DEG |
| B1= 3.3 DEG | PEDAL POS= 2.8 DEG |

ROTOR PARAMETERS

| | | |
|---|---|---|
| ADVANCE RATIO= .115 | SHAFT ALPHA= 1.0 DEG | PER CENT RPM= 101.0 |
| HOVER TIP MACH= .69 | CONTROL ALPHA= -2.3 DEG | RN/MACH= .159E+08 |
| TIP MAX-MACH= .77 | DELTA PSI= -9.1 DEG | CLP= .00360 |
| TIP MIN-MACH= .61 | | |
| .9R MAX-MACH= .70 | | |
| .9R MIN-MACH= .54 | THRUST FACTOR= .943E+07 N = .212E+07 LB | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 33874. N LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 27 7616. LB Y= -.00 = -.0
TIME 70316.50 (SEC) Z= 1.82 = 71.7

AERODYNAMIC FLIGHT STATE

| | | |
|---|---|---|
| DYNAMIC PRES= .54 KPA | = | 11.3 PSF |
| STATIC PRES= 100.4 KPA | = | 2097. PSF |
| TOTAL TEMP= 276.4 DEG K | = | 497.5 DEG R |
| STATIC TEMP= 275.9 DEG K | = | 496.7 DEG R |
| DENSITY= 1.27 KG/M3 | = | .00246 SLUG/FT3 |
| DENSITY ALT= -356. M | = | -1169. FT |
| SONIC SPEED= 333.6 M/SEC | = | 1094. FPS |
| RATE OF CLIMB= -22. M/MIN | = | -72. FPM |

T. AIRSPEED= 56.8 KT
A/C MACH NO= .088

BODY ALPHA= 1.1 DEG
BODY BETA= 5.2 DEG

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 29.09 | 95.5 | .004 | 29.09 | 95.4 | .003 | ROLL | 2.1 | .005 | .003 |
| Y | 2.64 | 8.7 | -.003 | 2.65 | 8.7 | -.003 | PITCH | .6 | .002 | .002 |
| Z | .55 | 1.8 | -.998 | .55 | 1.8 | -.998 | YAW | 269.6 | .007 | -.011 |

CONTROL ANGLES

| | |
|---|---|
| M.R. COLL= 6.4 DEG | HORIZ FIN= 6.7 DEG |
| A1= -.7 DEG | T.R. COLL= 1.8 DEG |
| B1= 3.5 DEG | PEDAL POS= 1.3 DEG |

ROTOR PARAMETERS

| | | |
|---|---|---|
| ADVANCE RATIO= .127 | SHAFT ALPHA= 1.1 DEG | PER CENT RPM= 101.0 |
| HOVER TIP MACH= .69 | CONTROL ALPHA= -2.4 DEG | RN/MACH= .159E+08 |
| TIP MAX-MACH= .78 | DELTA PSI= -5.2 DEG | CLP= .00358 |
| TIP MIN-MACH= .60 | | |
| .9R MAX-MACH= .71 | | |
| .9R MIN-MACH= .53 | THRUST FACTOR= .945E+07 N = .212E+07 LB | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

```
FLIGHT NO. 011        AIRCRAFT TOTAL WT = 33840. N     LOADED CG X=  5.05 M = 198.8 IN
RUN NO.    28                             7608. LB               Y=  -.00   =   -.0
TIME 70401.00 (SEC)                                              Z=  1.82   =   71.7

AERODYNAMIC FLIGHT STATE          DYNAMIC PRES=   .70 KPA   =   14.6  PSF
                                   STATIC PRES= 100.3 KPA   =  2095.  PSF
  T. AIRSPEED=  64.5 KT             TOTAL TEMP= 276.4 DEG K =  497.5  DEG R
  A/C MACH NO=  .100               STATIC TEMP= 275.9 DEG K =  496.6  DEG R

   BODY ALPHA=   1.6 DEG               DENSITY=  1.27 KG/M3 = .00246 SLUG/FT3
   BODY  BETA=   2.5 DEG           DENSITY ALT= -350. M     = -1148. FT
                                   SONIC SPEED= 333.5 M/SEC =  1094. FPS
                                 RATE OF CLIMB=  -76. M/MIN =  -250. FPM

INERTIAL FLIGHT STATE

  AXIS  CG LIN VEL    CG LIN ACC  HUB LIN VEL  HUB LIN ACC   AXIS    ANG POS  ANG RATES    ANG ACC
       (M/S)  (FPS)      (G)      (M/S)  (FPS)     (G)               (DEG)   (RAD/SEC)   (RAD/SEC2)

   X   33.15  108.8    -.002      33.13  108.7    -.000      ROLL      1.8      .007        -.013
   Y    1.42    4.7     .003       1.44    4.7     .000      PITCH     -.5      .011        -.008
   Z     .94    3.1    -.998        .94    3.1    -.998      YAW     329.0      .001        -.030

CONTROL ANGLES          M.R. COLL=   6.3 DEG     HORIZ FIN=   6.8 DEG
                               A1=   -.6 DEG     T.R. COLL=   1.8 DEG
                               B1=   3.6 DEG     PEDAL POS=   1.3 DEG

ROTOR PARAMETERS      ADVANCE RATIO= .145      SHAFT ALPHA=   1.6 DEG    PER CENT RPM= 100.8
                     HOVER TIP MACH= .69     CONTROL ALPHA=  -2.0 DEG         RN/MACH= .159E+08

                      TIP MAX-MACH= .79          DELTA PSI=  -2.5 DEG             CLP= .00359
                      TIP MIN-MACH= .59
                      .9R MAX-MACH= .72
                      .9R MIN-MACH= .52      THRUST FACTOR=  .942E+07 N  =  .212E+07 LB
```

NASA LANGLEY FLIGHT DATA   AH-1G  ----  PADS PCM DATA

FLIGHT NO. 011   AIRCRAFT TOTAL WT = 33796. N   LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 29   7598. LB   Y= -.00 = -.0
TIME 70489.50 (SEC)   Z= 1.82 = 71.7

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 73.2 KT
A/C MACH NO= .113

BODY ALPHA= -.3 DEG
BODY BETA= 2.0 DEG

DYNAMIC PRES= .90 KPA = 18.8 PSF
STATIC PRES= 100.2 KPA = 2092. PSF
TOTAL TEMP= 276.4 DEG K = 497.6 DEG R
STATIC TEMP= 275.7 DEG K = 496.3 DEG R

DENSITY= 1.27 KG/M3 = .00246 SLUG/FT3
DENSITY ALT= -341. M = -1119. FT
SONIC SPEED= 333.4 M/SEC = 1094. FPS
RATE OF CLIMB= -94. M/MIN = -310. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 37.63 | 123.4 | -.012 | 37.61 | 123.4 | -.012 | ROLL | 2.1 | .010 | -.018 |
| Y | 1.31 | 4.3 | .007 | 1.33 | 4.4 | .003 | PITCH | -2.6 | .007 | -.004 |
| Z | -.17 | -.6 | -.982 | -.17 | -.6 | -.982 | YAW | 332.0 | .003 | -.049 |

CONTROL ANGLES   M.R. COLL= 6.6 DEG   HORIZ FIN= 7.0 DEG
A1= -.5 DEG   T.R. COLL= 1.9 DEG
B1= 4.2 DEG   PEDAL POS= 1.3 DEG

ROTOR PARAMETERS   ADVANCE RATIO= .164   SHAFT ALPHA= -.3 DEG   PER CENT RPM= 100.9
HOVER TIP MACH= .69   CONTROL ALPHA= -4.4 DEG   RN/MACH= .159E+08

TIP MAX-MACH= .80   DELTA PSI= -2.0 DEG   CLP= .00352
TIP MIN-MACH= .58
.9R MAX-MACH= .73
.9R MIN-MACH= .51   THRUST FACTOR= .943E+07 N = .212E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011    AIRCRAFT TOTAL WT = 33751. N    LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 30    7588. LB    Y= -.00 = -.0
TIME 70565.00 (SEC)    Z= 1.82 = 71.7

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 1.04 KPA = 21.8 PSF
STATIC PRES= 100.1 KPA = 2091. PSF
T. AIRSPEED= 78.9 KT    TOTAL TEMP= 276.8 DEG K = 498.2 DEG R
A/C MACH NO= .122    STATIC TEMP= 275.9 DEG K = 496.7 DEG R

BODY ALPHA= .4 DEG    DENSITY= 1.26 KG/M3 = .00245 SLUG/FT3
BODY BETA= 3.0 DEG    DENSITY ALT= -327. M = -1074. FT
SONIC SPEED= 333.6 M/SEC = 1094. FPS
RATE OF CLIMB= -86. M/MIN = -282. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 40.52 | 132.9 | -.014 | 40.51 | 132.9 | -.011 | ROLL | 2.5 | .000 | -.008 |
| Y | 2.12 | 6.9 | -.010 | 2.12 | 6.9 | -.012 | PITCH | -1.5 | .004 | -.015 |
| Z | .31 | 1.0 | -.988 | .31 | 1.0 | -.988 | YAW | 327.4 | -.003 | -.012 |

CONTROL ANGLES    M.R. COLL= 6.4 DEG    HORIZ FIN= 7.2 DEG
A1= -.2 DEG    T.R. COLL= 2.1 DEG
B1= 4.6 DEG    PEDAL POS= 1.6 DEG

ROTOR PARAMETERS    ADVANCE RATIO= .176    SHAFT ALPHA= .4 DEG    PER CENT RPM= 101.1
HOVER TIP MACH= .69    CONTROL ALPHA= -4.1 DEG    RN/MACH= .159E+08

TIP MAX-MACH= .81    DELTA PSI= -3.0 DEG    CLP= .00353
TIP MIN-MACH= .57
.9R MAX-MACH= .74
.9R MIN-MACH= .50    THRUST FACTOR= .946E+07 N = .213E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 33718. N LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 31 7581. LB Y= -.00 = -.0
TIME 70619.20 (SEC) Z= 1.82 = 71.7

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 89.9 KT
A/C MACH NO= .139

BODY ALPHA= .2 DEG
BODY BETA= 1.7 DEG

DYNAMIC PRES= 1.35 KPA = 28.3 PSF
STATIC PRES= 100.2 KPA = 2092. PSF
TOTAL TEMP= 277.2 DEG K = 499.0 DEG R
STATIC TEMP= 276.1 DEG K = 497.1 DEG R

DENSITY= 1.26 KG/M3 = .00245 SLUG/FT3
DENSITY ALT= -326. M = -1068. FT
SONIC SPEED= 333.7 M/SEC = 1095. FPS
RATE OF CLIMB= -84. M/MIN = -276. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 46.22 | 151.6 | -.025 | 46.20 | 151.6 | -.023 | ROLL | 1.9 | .030 | -.060 |
| Y | 1.38 | 4.5 | -.002 | 1.44 | 4.7 | -.015 | PITCH | -1.4 | .011 | -.006 |
| Z | .20 | .6 | -1.007 | .20 | .6 | -1.007 | YAW | 338.7 | -.015 | -.065 |

CONTROL ANGLES

M.R. COLL= 7.0 DEG HORIZ FIN= 7.7 DEG
A1= -.2 DEG T.R. COLL= 2.2 DEG
B1= 5.4 DEG PEDAL POS= 1.7 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .201 SHAFT ALPHA= .2 DEG PER CENT RPM= 101.0
HOVER TIP MACH= .69 CONTROL ALPHA= -5.2 DEG RN/MACH= .159E+08

TIP MAX-MACH= .83 DELTA PSI= -1.8 DEG CLP= .00360
TIP MIN-MACH= .55
.9R MAX-MACH= .76
.9R MIN-MACH= .48 THRUST FACTOR= .943E+07 N = .212E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

| | | |
|---|---|---|
| FLIGHT NO. 011 | AIRCRAFT TOTAL WT = 33662. N | LOADED CG X= 5.05 M = 198.8 IN |
| RUN NO. 32 | 7568. LB | Y= -.00 = -.0 |
| TIME 70722.20 (SEC) | | Z= 1.82 = 71.8 |

AERODYNAMIC FLIGHT STATE

| | |
|---|---|
| | DYNAMIC PRES= 1.59 KPA = 33.1 PSF |
| | STATIC PRES= 100.3 KPA = 2095. PSF |
| T. AIRSPEED= 97.1 KT | TOTAL TEMP= 277.4 DEG K = 499.2 DEG R |
| A/C MACH NO= .150 | STATIC TEMP= 276.1 DEG K = 497.0 DEG R |
| BODY ALPHA= -.5 DEG | DENSITY= 1.27 KG/M3 = .00246 SLUG/FT3 |
| BODY BETA= .9 DEG | DENSITY ALT= -341. M = -1118. FT |
| | SONIC SPEED= 333.7 M/SEC = 1095. FPS |
| | RATE OF CLIMB= -62. M/MIN = -204. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 49.95 | 163.9 | -.029 | 49.93 | 163.8 | -.022 | ROLL | .4 | -.020 | .024 |
| Y | .82 | 2.7 | -.001 | .78 | 2.6 | .004 | PITCH | -1.6 | .010 | -.034 |
| Z | -.40 | -1.3 | -1.031 | -.40 | -1.3 | -1.031 | YAW | 289.4 | .019 | .092 |

CONTROL ANGLES

| | |
|---|---|
| M.R. COLL= 7.5 DEG | HORIZ FIN= 8.1 DEG |
| A1= .0 DEG | T.R. COLL= 1.9 DEG |
| B1= 6.3 DEG | PEDAL POS= 1.6 DEG |

ROTOR PARAMETERS

| | | |
|---|---|---|
| ADVANCE RATIO= .217 | SHAFT ALPHA= -.5 DEG | PER CENT RPM= 101.0 |
| HOVER TIP MACH= .69 | CONTROL ALPHA= -6.8 DEG | RN/MACH= .159E+08 |
| TIP MAX-MACH= .84 | DELTA PSI= -.9 DEG | CLP= .00368 |
| TIP MIN-MACH= .54 | | |
| .9R MAX-MACH= .77 | | |
| .9R MIN-MACH= .47 | THRUST FACTOR= .944E+07 N = .212E+07 LB | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 33542. N LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 34 7541. LB Y= -.00 = -.0
TIME 70916.00 (SEC) Z= 1.82 = 71.8

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 2.28 KPA = 47.6 PSF
STATIC PRES= 100.2 KPA = 2092. PSF
T. AIRSPEED= 116.4 KT
TOTAL TEMP= 277.6 DEG K = 499.7 DEG R
A/C MACH NO= .180
STATIC TEMP= 275.8 DEG K = 496.5 DEG R

BODY ALPHA= -2.4 DEG
DENSITY= 1.27 KG/M3 = .00246 SLUG/FT3
BODY BETA= -.3 DEG
DENSITY ALT= -339. M = -1113. FT
SONIC SPEED= 333.5 M/SEC = 1094. FPS
RATE OF CLIMB= -35. M/MIN = -115. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 59.81 | 196.2 | -.054 | 59.81 | 196.2 | -.055 | ROLL | .7 | -.005 | -.119 |
| Y | -.28 | -.9 | .012 | -.29 | -.9 | -.013 | PITCH | -2.9 | -.001 | .000 |
| Z | -2.48 | -8.1 | -.988 | -2.48 | -8.1 | -.988 | YAW | 148.3 | -.007 | -.006 |

CONTROL ANGLES

M.R. COLL= 8.5 DEG HORIZ FIN= 9.0 DEG
A1= -.3 DEG T.R. COLL= 2.3 DEG
B1= 7.6 DEG PEDAL POS= 2.0 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .261 SHAFT ALPHA= -2.4 DEG PER CENT RPM= 101.0
HOVER TIP MACH= .69 CONTROL ALPHA= -10.0 DEG RN/MACH= .159E+08

TIP MAX-MACH= .87 DELTA PSI= .3 DEG CLP= .00351
TIP MIN-MACH= .51
.9R MAX-MACH= .80
.9R MIN-MACH= .44 THRUST FACTOR= .944E+07 N = .212E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

| | | |
|---|---|---|
| FLIGHT NO. 011 | AIRCRAFT TOTAL WT = 33507. N | LOADED CG X= 5.05 M = 198.8 IN |
| RUN NO. 35 | 7533. LB | Y= -.00 = -.0 |
| TIME 70960.00 (SEC) | | Z= 1.82 = 71.8 |

AERODYNAMIC FLIGHT STATE

| | |
|---|---|
| | DYNAMIC PRES= 2.58 KPA = 53.8 PSF |
| | STATIC PRES= 100.1 KPA = 2091. PSF |
| T. AIRSPEED= 123.6 KT | TOTAL TEMP= 277.8 DEG K = 500.0 DEG R |
| A/C MACH NO= .191 | STATIC TEMP= 275.8 DEG K = 496.4 DEG R |
| BODY ALPHA= -3.9 DEG | DENSITY= 1.27 KG/M3 = .00246 SLUG/FT3 |
| BODY BETA= 1.1 DEG | DENSITY ALT= -335. M = -1099. FT |
| | SONIC SPEED= 333.5 M/SEC = 1094. FPS |
| | RATE OF CLIMB= -49. M/MIN = -160. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 63.44 | 208.1 | -.061 | 63.43 | 208.1 | -.054 | ROLL | .7 | -.002 | .062 |
| Y | 1.26 | 4.1 | .006 | 1.25 | 4.1 | .020 | PITCH | -4.6 | .002 | -.032 |
| Z | -4.29 | -14.1 | -.950 | -4.29 | -14.1 | -.950 | YAW | 153.8 | .015 | -.010 |

CONTROL ANGLES

| | |
|---|---|
| M.R. COLL= 9.2 DEG | HORIZ FIN= 9.6 DEG |
| A1= .1 DEG | T.R. COLL= 2.9 DEG |
| B1= 8.6 DEG | PEDAL POS= 2.3 DEG |

ROTOR PARAMETERS

| | | |
|---|---|---|
| ADVANCE RATIO= .277 | SHAFT ALPHA= -3.9 DEG | PER CENT RPM= 101.0 |
| HOVER TIP MACH= .69 | CONTROL ALPHA= -12.4 DEG | RN/MACH= .159E+08 |
| TIP MAX-MACH= .88 | DELTA PSI= -1.1 DEG | CLP= .00338 |
| TIP MIN-MACH= .50 | | |
| .9R MAX-MACH= .81 | | |
| .9R MIN-MACH= .43 | THRUST FACTOR= .943E+07 N = .212E+07 LB | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 33485. N LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 36 7528. LB Y= -.00 = -.0
TIME 71007.20 (SEC) Z= 1.82 = 71.8

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 3.06 KPA = 64.0 PSF
STATIC PRES= 100.3 KPA = 2094. PSF
T. AIRSPEED= 134.6 KT TOTAL TEMP= 278.3 DEG K = 500.9 DEG R
A/C MACH NO= .208 STATIC TEMP= 275.9 DEG K = 496.6 DEG R

BODY ALPHA= -4.2 DEG DENSITY= 1.27 KG/M3 = .00246 SLUG/FT3
BODY BETA= 1.1 DEG DENSITY ALT= -346. M = -1134. FT
SONIC SPEED= 333.5 M/SEC = 1094. FPS
RATE OF CLIMB= -81. M/MIN = -266. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 69.06 | 226.6 | -.080 | 69.03 | 226.5 | -.073 | ROLL | -1.6 | -.023 | .086 |
| Y | 1.27 | 4.2 | .007 | 1.22 | 4.0 | .025 | PITCH | -5.3 | .012 | -.037 |
| Z | -5.01 | -16.4 | -1.009 | -5.01 | -16.4 | -1.009 | YAW | 138.9 | .011 | .003 |

CONTROL ANGLES M.R. COLL= 10.1 DEG HORIZ FIN= 10.1 DEG
A1= .2 DEG T.R. COLL= 3.1 DEG
B1= 9.3 DEG PEDAL POS= 2.7 DEG

ROTOR PARAMETERS ADVANCE RATIO= .302 SHAFT ALPHA= -4.2 DEG PER CENT RPM= 100.7
HOVER TIP MACH= .69 CONTROL ALPHA= -13.4 DEG RN/MACH= .159E+08

TIP MAX-MACH= .90 DELTA PSI= -1.0 DEG CLP= .00360
TIP MIN-MACH= .48
.9R MAX-MACH= .83
.9R MIN-MACH= .41 THRUST FACTOR= .940E+07 N = .211E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 33440. N LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 37 7518. LB Y= -.00 = -.0
TIME 71068.00 (SEC) Z= 1.83 = 71.9

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 142.8 KT
A/C MACH NO= .220

BODY ALPHA= -6.1 DEG
BODY BETA= 1.6 DEG

| | | | | |
|---|---|---|---|---|
| DYNAMIC PRES= | 3.45 | KPA | 72.0 | PSF |
| STATIC PRES= | 100.3 | KPA | 2094. | PSF |
| TOTAL TEMP= | 278.7 | DEG K | 501.6 | DEG R |
| STATIC TEMP= | 276.0 | DEG K | 496.8 | DEG R |
| DENSITY= | 1.27 | KG/M3 | .00246 | SLUG/FT3 |
| DENSITY ALT= | -342. | M | -1124. | FT |
| SONIC SPEED= | 333.6 | M/SEC | 1094. | FPS |
| RATE OF CLIMB= | -34. | M/MIN | -111. | FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 73.00 | 239.5 | -.098 | 72.98 | 239.5 | -.102 | ROLL | .2 | -.005 | .011 |
| Y | 2.00 | 6.6 | -.016 | 1.99 | 6.5 | -.013 | PITCH | -6.5 | .009 | .017 |
| Z | -7.76 | -25.4 | -.974 | -7.76 | -25.4 | -.974 | YAW | 144.7 | .001 | .053 |

CONTROL ANGLES

M.R. COLL= 11.0 DEG HORIZ FIN= 10.6 DEG
A1= -.1 DEG T.R. COLL= 3.6 DEG
B1= 9.9 DEG PEDAL POS= 3.4 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .320 SHAFT ALPHA= -6.1 DEG PER CENT RPM= 101.0
HOVER TIP MACH= .69 CONTROL ALPHA= -15.9 DEG RN/MACH= .159E+08

TIP MAX-MACH= .91 DELTA PSI= -1.6 DEG CLP= .00345
TIP MIN-MACH= .47
.9R MAX-MACH= .84
.9R MIN-MACH= .40 THRUST FACTOR= .945E+07 N = .212E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 33391. N LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 38 7507. LB Y= -.00 = -.0
TIME 71113.00 (SEC) Z= 1.83 = 71.9

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 150.4 KT
A/C MACH NO= .232

BODY ALPHA= -7.2 DEG
BODY BETA= 1.3 DEG

DYNAMIC PRES= 3.83 KPA = 80.1 PSF
STATIC PRES= 100.2 KPA = 2093. PSF
TOTAL TEMP= 278.8 DEG K = 501.8 DEG R
STATIC TEMP= 275.8 DEG K = 496.4 DEG R

DENSITY= 1.27 KG/M3 = .00246 SLUG/FT3
DENSITY ALT= -344. M = -1128. FT
SONIC SPEED= 333.5 M/SEC = 1094. FPS
RATE OF CLIMB= -73. M/MIN = -238. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 76.76 | 251.8 | -.113 | 76.75 | 251.8 | -.111 | ROLL | 3.1 | -.015 | -.083 |
| Y | 1.76 | 5.8 | -.002 | 1.73 | 5.7 | -.019 | PITCH | -8.0 | .002 | -.010 |
| Z | -9.64 | -31.6 | -.984 | -9.64 | -31.6 | -.984 | YAW | 147.6 | .011 | -.015 |

CONTROL ANGLES

M.R. COLL= 12.1 DEG HORIZ FIN= 11.3 DEG
A1= -.5 DEG T.R. COLL= 4.7 DEG
B1= 10.6 DEG PEDAL POS= 4.4 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .337 SHAFT ALPHA= -7.2 DEG PER CENT RPM= 101.0
HOVER TIP MACH= .69 CONTROL ALPHA= -17.8 DEG RN/MACH= .159E+08

TIP MAX-MACH= .92 DELTA PSI= -1.3 DEG CLP= .00348
TIP MIN-MACH= .46
.9R MAX-MACH= .85
.9R MIN-MACH= .39 THRUST FACTOR= .945E+07 N = .212E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 33229. N LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 39 7471. LB Y= -.00 = -.0
TIME 71348.50 (SEC) Z= 1.83 = 71.9

AERODYNAMIC FLIGHT STATE

| | | | |
|---|---|---|---|
| | | DYNAMIC PRES= .57 KPA | = 12.0 PSF |
| | | STATIC PRES= 101.8 KPA | = 2127. PSF |
| T. AIRSPEED= | 58.3 KT | TOTAL TEMP= 277.8 DEG K | = 500.1 DEG R |
| A/C MACH NO= | .090 | STATIC TEMP= 277.4 DEG K | = 499.3 DEG R |
| BODY ALPHA= | 1.5 DEG | DENSITY= 1.28 KG/M3 | = .00248 SLUG/FT3 |
| BODY BETA= | 4.5 DEG | DENSITY ALT= -452. M | = -1484. FT |
| | | SONIC SPEED= 334.4 M/SEC | = 1097. FPS |
| | | RATE OF CLIMB= -61. M/MIN | = -199. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 29.88 | 98.0 | .006 | 29.88 | 98.0 | .014 | ROLL | 2.1 | -.007 | -.004 |
| Y | 2.32 | 7.6 | -.001 | 2.31 | 7.6 | -.002 | PITCH | -.3 | .000 | -.039 |
| Z | .78 | 2.6 | -1.000 | .78 | 2.6 | -1.000 | YAW | 317.7 | .006 | -.013 |

CONTROL ANGLES

| | | | |
|---|---|---|---|
| M.R. COLL= | 6.4 DEG | HORIZ FIN= | 6.8 DEG |
| A1= | -.8 DEG | T.R. COLL= | 1.8 DEG |
| B1= | 3.7 DEG | PEDAL POS= | 1.3 DEG |

ROTOR PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| ADVANCE RATIO= | .131 | SHAFT ALPHA= | 1.5 DEG | PER CENT RPM= | 101.0 |
| HOVER TIP MACH= | .69 | CONTROL ALPHA= | -2.2 DEG | RN/MACH= | .158E+08 |
| TIP MAX-MACH= | .78 | DELTA PSI= | -4.4 DEG | CLP= | .00348 |
| TIP MIN-MACH= | .60 | | | | |
| .9R MAX-MACH= | .71 | | | | |
| .9R MIN-MACH= | .53 | THRUST FACTOR= | .954E+07 N = .214E+07 LB | | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 33184. N LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 40 7461. LB Y= -.00 = -.0
TIME 71407.00 (SEC) Z= 1.83 = 72.0

AERODYNAMIC FLIGHT STATE

| | | |
|---|---|---|
| DYNAMIC PRES= .68 KPA | = | 14.2 PSF |
| STATIC PRES= 101.9 KPA | = | 2127. PSF |
| TOTAL TEMP= 277.6 DEG K | = | 499.8 DEG R |
| STATIC TEMP= 277.1 DEG K | = | 498.8 DEG R |
| DENSITY= 1.28 KG/M3 | = | .00249 SLUG/FT3 |
| DENSITY ALT= -465. M | = | -1525. FT |
| SONIC SPEED= 334.3 M/SEC | = | 1097. FPS |
| RATE OF CLIMB= -35. M/MIN | = | -115. FPM |

T. AIRSPEED= 63.4 KT
A/C MACH NO= .098

BODY ALPHA= .2 DEG
BODY BETA= 5.2 DEG

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 32.50 | 106.6 | -.003 | 32.49 | 106.6 | -.001 | ROLL | 1.1 | -.010 | -.006 |
| Y | 2.92 | 9.6 | -.003 | 2.90 | 9.5 | -.004 | PITCH | -.7 | .008 | -.007 |
| Z | .11 | .4 | -.983 | .11 | .4 | -.983 | YAW | 320.7 | .002 | .023 |

CONTROL ANGLES

| | |
|---|---|
| M.R. COLL= 6.3 DEG | HORIZ FIN= 6.8 DEG |
| A1= -.4 DEG | T.R. COLL= 2.0 DEG |
| B1= 3.7 DEG | PEDAL POS= 1.4 DEG |

ROTOR PARAMETERS

| | | |
|---|---|---|
| ADVANCE RATIO= .142 | SHAFT ALPHA= .2 DEG | PER CENT RPM= 100.8 |
| HOVER TIP MACH= .69 | CONTROL ALPHA= -3.5 DEG | RN/MACH= .158E+08 |
| TIP MAX-MACH= .78 | DELTA PSI= -5.1 DEG | CLP= .00343 |
| TIP MIN-MACH= .59 | | |
| .9R MAX-MACH= .72 | | |
| .9R MIN-MACH= .52 | THRUST FACTOR= .952E+07 N = .214E+07 LB | |

NASA LANGLEY FLIGHT DATA   AH-1G  ----   PADS PCM DATA

FLIGHT NO. 011   AIRCRAFT TOTAL WT = 33106. N   LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 41   7443. LB   Y= -.00 = -.0
TIME 71513.00 (SEC)   Z= 1.83 = 72.0

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 72.7 KT
A/C MACH NO= .112

BODY ALPHA= -.1 DEG
BODY BETA= 2.9 DEG

DYNAMIC PRES= .90 KPA = 18.7 PSF
STATIC PRES= 101.8 KPA = 2127. PSF
TOTAL TEMP= 277.8 DEG K = 500.1 DEG R
STATIC TEMP= 277.1 DEG K = 498.9 DEG R

DENSITY= 1.28 KG/M3 = .00249 SLUG/FT3
DENSITY ALT= -462. M = -1514. FT
SONIC SPEED= 334.3 M/SEC = 1097. FPS
RATE OF CLIMB= -73. M/MIN = -240. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 37.35 | 122.6 | -.010 | 37.34 | 122.5 | -.005 | ROLL | 2.2 | .007 | .031 |
| Y | 1.88 | 6.2 | -.010 | 1.89 | 6.2 | -.003 | PITCH | -1.8 | .006 | -.024 |
| Z | -.04 | -.1 | -.986 | -.04 | -.1 | -.987 | YAW | 326.7 | -.003 | .033 |

CONTROL ANGLES

M.R. COLL= 6.4 DEG   HORIZ FIN= 7.0 DEG
A1= -.2 DEG   T.R. COLL= 1.9 DEG
B1= 4.3 DEG   PEDAL POS= 1.3 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .163   SHAFT ALPHA= -.1 DEG   PER CENT RPM= 101.2
HOVER TIP MACH= .69   CONTROL ALPHA= -4.3 DEG   RN/MACH= .158E+08

TIP MAX-MACH= .80   DELTA PSI= -2.9 DEG   CLP= .00341
TIP MIN-MACH= .58
.9R MAX-MACH= .73
.9R MIN-MACH= .51   THRUST FACTOR= .958E+07 N = .215E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 32995. N LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 43 7418. LB Y= -.00 = -.0
TIME 71646.00 (SEC) Z= 1.83 = 72.1

AERODYNAMIC FLIGHT STATE

| | | | |
|---|---|---|---|
| T. AIRSPEED= 87.5 KT | DYNAMIC PRES= 1.30 KPA | = 27.1 PSF | |
| A/C MACH NO= .135 | STATIC PRES= 101.9 KPA | = 2128. PSF | |
| | TOTAL TEMP= 278.4 DEG K | = 501.1 DEG R | |
| | STATIC TEMP= 277.4 DEG K | = 499.3 DEG R | |
| BODY ALPHA= -.3 DEG | DENSITY= 1.28 KG/M3 | = .00248 SLUG/FT3 | |
| BODY BETA= 2.0 DEG | DENSITY ALT= -460. M | = -1510. FT | |
| | SONIC SPEED= 334.4 M/SEC | = 1097. FPS | |
| | RATE OF CLIMB= -122. M/MIN | = -399. FPM | |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 44.97 | 147.5 | -.026 | 44.96 | 147.5 | -.026 | ROLL | 3.6 | -.002 | .005 |
| Y | 1.60 | 5.2 | -.006 | 1.59 | 5.2 | -.005 | PITCH | -2.8 | .001 | -.001 |
| Z | -.26 | -.8 | -.989 | -.26 | -.8 | -.989 | YAW | 320.7 | .001 | -.024 |

CONTROL ANGLES

| | | | |
|---|---|---|---|
| M.R. COLL= | 6.6 DEG | HORIZ FIN= | 7.4 DEG |
| A1= | -.0 DEG | T.R. COLL= | 2.0 DEG |
| B1= | 5.0 DEG | PEDAL POS= | 1.5 DEG |

ROTOR PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| ADVANCE RATIO= | .196 | SHAFT ALPHA= | -.3 DEG | PER CENT RPM= | 101.0 |
| HOVER TIP MACH= | .69 | CONTROL ALPHA= | -5.3 DEG | RN/MACH= | .158E+08 |
| TIP MAX-MACH= | .82 | DELTA PSI= | -2.0 DEG | CLP= | .00341 |
| TIP MIN-MACH= | .55 | | | | |
| .9R MAX-MACH= | .75 | | | | |
| .9R MIN-MACH= | .48 | THRUST FACTOR= | .955E+07 N = .215E+07 LB | | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 32962. N LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 44 7411. LB Y= -.00 = -.0
TIME 71692.00 (SEC) Z= 1.83 = 72.1

AERODYNAMIC FLIGHT STATE

| | | | |
|---|---|---|---|
| T. AIRSPEED= 96.6 KT | DYNAMIC PRES= 1.59 KPA | = | 33.2 PSF |
| A/C MACH NO= .149 | STATIC PRES= 101.9 KPA | = | 2129. PSF |
| | TOTAL TEMP= 278.4 DEG K | = | 501.2 DEG R |
| | STATIC TEMP= 277.2 DEG K | = | 499.0 DEG R |
| BODY ALPHA= -1.4 DEG | DENSITY= 1.28 KG/M3 | = | .00249 SLUG/FT3 |
| BODY BETA= .8 DEG | DENSITY ALT= -468. M | = | -1537. FT |
| | SONIC SPEED= 334.3 M/SEC | = | 1097. FPS |
| | RATE OF CLIMB= -47. M/MIN | = | -153. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 49.68 | 163.0 | -.035 | 49.66 | 162.9 | -.035 | ROLL | -3.3 | -.003 | .027 |
| Y | .71 | 2.3 | .004 | .71 | 2.3 | .010 | PITCH | -2.4 | .009 | -.000 |
| Z | -1.24 | -4.1 | -.983 | -1.24 | -4.1 | -.983 | YAW | 317.2 | -.012 | -.003 |

CONTROL ANGLES

| | |
|---|---|
| M.R. COLL= 7.3 DEG | HORIZ FIN= 7.9 DEG |
| A1= -.1 DEG | T.R. COLL= 2.1 DEG |
| B1= 6.0 DEG | PEDAL POS= 1.8 DEG |

ROTOR PARAMETERS

| | | |
|---|---|---|
| ADVANCE RATIO= .217 | SHAFT ALPHA= -1.4 DEG | PER CENT RPM= 100.8 |
| HOVER TIP MACH= .69 | CONTROL ALPHA= -7.5 DEG | RN/MACH= .158E+08 |
| TIP MAX-MACH= .84 | DELTA PSI= -.8 DEG | CLP= .00340 |
| TIP MIN-MACH= .54 | | |
| .9R MAX-MACH= .77 | | |
| .9R MIN-MACH= .47 | THRUST FACTOR= .953E+07 N = .214E+07 LB | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011　AIRCRAFT TOTAL WT = 32917. N　LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 45　7401. LB　Y= -.00 = -.0
TIME 71766.00 (SEC)　Z= 1.83 = 72.1

AERODYNAMIC FLIGHT STATE

T. AIRSPEED= 105.1 KT
A/C MACH NO= .162

BODY ALPHA= -1.3 DEG
BODY BETA= .4 DEG

DYNAMIC PRES= 1.88 KPA = 39.3 PSF
STATIC PRES= 101.9 KPA = 2128. PSF
TOTAL TEMP= 278.8 DEG K = 501.9 DEG R
STATIC TEMP= 277.4 DEG K = 499.3 DEG R

DENSITY= 1.28 KG/M3 = .00248 SLUG/FT3
DENSITY ALT= -458. M = -1503. FT
SONIC SPEED= 334.4 M/SEC = 1097. FPS
RATE OF CLIMB= -96. M/MIN = -315. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 54.06 | 177.4 | -.045 | 54.06 | 177.4 | -.049 | ROLL | 2.0 | -.006 | .003 |
| Y | .35 | 1.2 | .004 | .34 | 1.1 | .005 | PITCH | -3.0 | .000 | .022 |
| Z | -1.21 | -4.0 | -1.015 | -1.21 | -4.0 | -1.014 | YAW | 324.5 | .009 | -.020 |

CONTROL ANGLES　M.R. COLL= 7.6 DEG　HORIZ FIN= 8.3 DEG
A1= -.1 DEG　T.R. COLL= 2.0 DEG
B1= 6.6 DEG　PEDAL POS= 1.5 DEG

ROTOR PARAMETERS　ADVANCE RATIO= .236　SHAFT ALPHA= -1.3 DEG　PER CENT RPM= 100.7
HOVER TIP MACH= .69　CONTROL ALPHA= -7.9 DEG　RN/MACH= .158E+08

TIP MAX-MACH= .85　DELTA PSI= -.4 DEG　CLP= .00351
TIP MIN-MACH= .52
.9R MAX-MACH= .78
.9R MIN-MACH= .46　THRUST FACTOR= .950E+07 N = .214E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

| | | |
|---|---|---|
| FLIGHT NO. 011 | AIRCRAFT TOTAL WT = 32840. N | LOADED CG X= 5.05 M = 198.7 IN |
| RUN NO. 46 | 7383. LB | Y= -.00 = -.0 |
| TIME 71882.00 (SEC) | | Z= 1.83 = 72.1 |

AERODYNAMIC FLIGHT STATE

| | | | |
|---|---|---|---|
| | DYNAMIC PRES= | 2.17 KPA | = 45.2 PSF |
| | STATIC PRES= | 101.9 KPA | = 2129. PSF |
| T. AIRSPEED= 112.8 KT | TOTAL TEMP= | 279.1 DEG K | = 502.4 DEG R |
| A/C MACH NO= .174 | STATIC TEMP= | 277.5 DEG K | = 499.4 DEG R |
| BODY ALPHA= -2.4 DEG | DENSITY= | 1.28 KG/M3 | = .00248 SLUG/FT3 |
| BODY BETA= .8 DEG | DENSITY ALT= | -460. M | = -1509. FT |
| | SONIC SPEED= | 334.5 M/SEC | = 1097. FPS |
| | RATE OF CLIMB= | -89. M/MIN | = -294. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 57.96 | 190.2 | -.052 | 57.96 | 190.1 | -.054 | ROLL | .7 | -.009 | .070 |
| Y | .78 | 2.6 | .006 | .76 | 2.5 | .021 | PITCH | -3.8 | .002 | .011 |
| Z | -2.38 | -7.8 | -.992 | -2.38 | -7.8 | -.992 | YAW | 142.5 | .012 | .003 |

CONTROL ANGLES

| | | | |
|---|---|---|---|
| M.R. COLL= | 8.0 DEG | HORIZ FIN= | 8.7 DEG |
| A1= | .1 DEG | T.R. COLL= | 2.6 DEG |
| B1= | 7.3 DEG | PEDAL POS= | 1.7 DEG |

ROTOR PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| ADVANCE RATIO= | .253 | SHAFT ALPHA= | -2.4 DEG | PER CENT RPM= | 101.0 |
| HOVER TIP MACH= | .69 | CONTROL ALPHA= | -9.6 DEG | RN/MACH= | .158E+08 |
| TIP MAX-MACH= | .86 | DELTA PSI= | -.8 DEG | CLP= | .00341 |
| TIP MIN-MACH= | .51 | | | | |
| .9R MAX-MACH= | .79 | | | | |
| .9R MIN-MACH= | .45 | THRUST FACTOR= | .955E+07 N | = | .215E+07 LB |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 32791. N LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 47 7372. LB Y= -.00 = -.0
TIME 71965.00 (SEC) Z= 1.83 = 72.2

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 2.56 KPA = 53.6 PSF
STATIC PRES= 101.9 KPA = 2129. PSF
T. AIRSPEED= 122.6 KT TOTAL TEMP= 279.4 DEG K = 502.8 DEG R
A/C MACH NO= .189 STATIC TEMP= 277.4 DEG K = 499.3 DEG R

BODY ALPHA= -2.9 DEG DENSITY= 1.28 KG/M3 = .00249 SLUG/FT3
BODY BETA= -.0 DEG DENSITY ALT= -464. M = -1524. FT
SONIC SPEED= 334.4 M/SEC = 1097. FPS
RATE OF CLIMB= -73. M/MIN = -240. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 62.99 | 206.7 | -.067 | 62.97 | 206.6 | -.070 | ROLL | -.6 | .044 | -.008 |
| Y | -.00 | -.0 | .007 | .09 | .3 | .006 | PITCH | -4.0 | .010 | .010 |
| Z | -3.19 | -10.5 | -1.022 | -3.19 | -10.5 | -1.022 | YAW | 146.9 | .005 | .024 |

CONTROL ANGLES

M.R. COLL= 8.9 DEG HORIZ FIN= 9.3 DEG
A1= .0 DEG T.R. COLL= 2.7 DEG
B1= 8.1 DEG PEDAL POS= 2.1 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .275 SHAFT ALPHA= -2.9 DEG PER CENT RPM= 100.9
HOVER TIP MACH= .69 CONTROL ALPHA= -11.0 DEG RN/MACH= .158E+08

TIP MAX-MACH= .88 DELTA PSI= -.1 DEG CLP= .00351
TIP MIN-MACH= .50
.9R MAX-MACH= .81
.9R MIN-MACH= .43 THRUST FACTOR= .954E+07 N = .215E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 32751. N LOADED CG X= 5.05 M = 198.7 IN
RUN NO. 48 7363. LB Y= -.00 = -.0
TIME 72022.50 (SEC) Z= 1.83 = 72.2

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 3.00 KPA = 62.7 PSF
STATIC PRES= 101.9 KPA = 2129. PSF
T. AIRSPEED= 132.6 KT TOTAL TEMP= 279.7 DEG K = 503.4 DEG R
A/C MACH NO= .204 STATIC TEMP= 277.4 DEG K = 499.3 DEG R

BODY ALPHA= -3.7 DEG DENSITY= 1.28 KG/M3 = .00249 SLUG/FT3
BODY BETA= .2 DEG DENSITY ALT= -464. M = -1522. FT
SONIC SPEED= 334.4 M/SEC = 1097. FPS
RATE OF CLIMB= -57. M/MIN = -187. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 68.06 | 223.3 | -.085 | 68.04 | 223.2 | -.079 | ROLL | .0 | .011 | -.039 |
| Y | .20 | .7 | .013 | .23 | .7 | .004 | PITCH | -4.5 | .008 | -.030 |
| Z | -4.46 | -14.6 | -1.010 | -4.46 | -14.6 | -1.010 | YAW | 157.0 | .003 | -.000 |

CONTROL ANGLES M.R. COLL= 9.7 DEG HORIZ FIN= 10.0 DEG
A1= -.2 DEG T.R. COLL= 3.1 DEG
B1= 9.0 DEG PEDAL POS= 2.5 DEG

ROTOR PARAMETERS ADVANCE RATIO= .298 SHAFT ALPHA= -3.7 DEG PER CENT RPM= 100.7
HOVER TIP MACH= .69 CONTROL ALPHA= -12.8 DEG RN/MACH= .158E+08

TIP MAX-MACH= .89 DELTA PSI= -.2 DEG CLP= .00348
TIP MIN-MACH= .48
.9R MAX-MACH= .82
.9R MIN-MACH= .41 THRUST FACTOR= .950E+07 N = .214E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 32711. N LOADED CG X= 5.05 M = 198.6 IN
RUN NO. 49 7354. LB Y= -.00 = -.0
TIME 72071.00 (SEC) Z= 1.83 = 72.?

AERODYNAMIC FLIGHT STATE

| | | | |
|---|---|---|---|
| T. AIRSPEED= 143.7 KT | DYNAMIC PRES= 3.53 KPA | = | 73.8 PSF |
| A/C MACH NO= .221 | STATIC PRES= 101.9 KPA | = | 2128. PSF |
| | TOTAL TEMP= 280.2 DEG K | = | 504.3 DEG R |
| | STATIC TEMP= 277.4 DEG K | = | 499.4 DEG R |
| BODY ALPHA= -6.2 DEG | DENSITY= 1.28 KG/M3 | = | .00248 SLUG/FT3 |
| BODY BETA= 2.1 DEG | DENSITY ALT= -458. M | = | -1501. FT |
| | SONIC SPEED= 334.5 M/SEC | = | 1097. FPS |
| | RATE OF CLIMB= -13. M/MIN | = | -42. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 73.45 | 241.0 | -.101 | 73.44 | 240.9 | -.099 | ROLL | 2.1 | -.003 | -.007 |
| Y | 2.71 | 8.9 | -.018 | 2.70 | 8.9 | -.020 | PITCH | -6.3 | .005 | -.010 |
| Z | -7.94 | -26.0 | -.981 | -7.94 | -26.0 | -.981 | YAW | 146.9 | .001 | -.045 |

CONTROL ANGLES

| | |
|---|---|
| M.R. COLL= 11.0 DEG | HORIZ FIN= 10.7 DEG |
| A1= .1 DEG | T.R. COLL= 4.0 DEG |
| B1= 10.0 DEG | PEDAL POS= 3.5 DEG |

ROTOR PARAMETERS

| | | |
|---|---|---|
| ADVANCE RATIO= .321 | SHAFT ALPHA= -6.2 DEG | PER CENT RPM= 101.2 |
| HOVER TIP MACH= .69 | CONTROL ALPHA= -16.2 DEG | RN/MACH= .158E+08 |
| TIP MAX-MACH= .91 | DELTA PSI= -2.1 DEG | CLP= .00335 |
| TIP MIN-MACH= .47 | | |
| .9R MAX-MACH= .84 | | |
| .9R MIN-MACH= .40 | THRUST FACTOR= .958E+07 N = .215E+07 LB | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 011 AIRCRAFT TOTAL WT = 32684. N LOADED CG X= 5.05 M = 198.6 IN
RUN NO. 50 7348. LB Y= -.00 = -.0
TIME 72100.00 (SEC) Z= 1.83 = 72.2

AERODYNAMIC FLIGHT STATE

DYNAMIC PRES= 3.79 KPA = 79.1 PSF
STATIC PRES= 102.0 KPA = 2129. PSF
TOTAL TEMP= 280.5 DEG K = 504.9 DEG R
STATIC TEMP= 277.6 DEG K = 499.6 DEG R

T. AIRSPEED= 148.7 KT
A/C MACH NO= .229

BODY ALPHA= -7.2 DEG
BODY BETA= 1.6 DEG

DENSITY= 1.28 KG/M3 = .00248 SLUG/FT3
DENSITY ALT= -458. M = -1502. FT
SONIC SPEED= 334.5 M/SEC = 1098. FPS
RATE OF CLIMB= -12. M/MIN = -38. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 75.87 | 248.9 | -.106 | 75.87 | 248.9 | -.100 | ROLL | 2.1 | -.002 | .080 |
| Y | 2.19 | 7.2 | -.002 | 2.18 | 7.2 | .014 | PITCH | -7.3 | -.001 | -.030 |
| Z | -9.59 | -31.5 | -.972 | -9.59 | -31.5 | -.972 | YAW | 143.2 | .014 | -.022 |

CONTROL ANGLES

M.R. COLL= 12.0 DEG HORIZ FIN= 11.4 DEG
A1= -.2 DEG T.R. COLL= 4.3 DEG
B1= 10.8 DEG PEDAL POS= 3.8 DEG

ROTOR PARAMETERS

ADVANCE RATIO= .332 SHAFT ALPHA= -7.2 DEG PER CENT RPM= 101.2
HOVER TIP MACH= .69 CONTROL ALPHA= -18.0 DEG RN/MACH= .158E+08

TIP MAX-MACH= .92 DELTA PSI= -1.6 DEG CLP= .00331
TIP MIN-MACH= .46
.9R MAX-MACH= .85
.9R MIN-MACH= .39 THRUST FACTOR= .959E+07 N = .216E+07 LB

NASA LANGLEY FLIGHT DATA AH-1G ---- PADS PCM DATA

FLIGHT NO. 27 AIRCRAFT TOTAL WT = 33462. N LOADED CG X= 5.05 M = 198.8 IN
RUN NO. 30 7523. LB Y= -.00 = -.0
TIME 66698.70 (SEC) Z= 1.82 = 71.8

AERODYNAMIC FLIGHT STATE

| | | |
|---|---|---|
| | DYNAMIC PRES= 1.85 KPA | = 38.6 PSF |
| | STATIC PRES= 96.3 KPA | = 2011. PSF |
| T. AIRSPEED= 110.5 KT | TOTAL TEMP= 296.1 DEG K | = 532.9 DEG R |
| A/C MACH NO= .165 | STATIC TEMP= 294.5 DEG K | = 530.0 DEG R |
| BODY ALPHA= 5.2 DEG | DENSITY= 1.14 KG/M3 | = .00221 SLUG/FT3 |
| BODY BETA= .3 DEG | DENSITY ALT= 749. M | = 2456. FT |
| | SONIC SPEED= 344.6 M/SEC | = 1130. FPS |
| | RATE OF CLIMB= -400. M/MIN | = -1313. FPM |

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 56.62 | 185.8 | -.072 | 56.32 | 184.8 | -.090 | ROLL | 1.9 | -.011 | -.054 |
| Y | .32 | 1.1 | .011 | .30 | 1.0 | .001 | PITCH | -1.5 | .144 | .083 |
| Z | 5.14 | 16.9 | -1.595 | 5.15 | 16.9 | -1.591 | YAW | 23.7 | -.040 | -.035 |

CONTROL ANGLES

| | | |
|---|---|---|
| | M.R. COLL= 8.3 DEG | HORIZ FIN= 6.9 DEG |
| | A1= .5 DEG | T.R. COLL= 2.4 DEG |
| | B1= 3.8 DEG | PEDAL POS= 3.1 DEG |

ROTOR PARAMETERS

| | | |
|---|---|---|
| ADVANCE RATIO= .249 | SHAFT ALPHA= 5.2 DEG | PER CENT RPM= 100.4 |
| HOVER TIP MACH= .66 | CONTROL ALPHA= 1.5 DEG | RN/MACH= .146E+08 |
| TIP MAX-MACH= .83 | DELTA PSI= -.3 DEG | CLP= .00635 |
| TIP MIN-MACH= .50 | | |
| .9R MAX-MACH= .76 | | |
| .9R MIN-MACH= .43 | THRUST FACTOR= .840E+07 N = .189E+07 LB | |

NASA LANGLEY FLIGHT DATA AH-1G ---- PAOS PCM DATA

FLIGHT NO. 27 AIRCRAFT TOTAL T = 32773. N LOADED CG X= 5.0[illegible] M = 19[illegible].7 IN
RUN NO. 118 7368. LB Y= -.00 = -.0
TIME 67596.30 (SEC) Z= 1.83 = 72.2

AERODYNAMIC FLIGHT STATE DYNAMIC PRES= 1.78 KPA = 37.2 PSF
STATIC PRES= 96.6 KPA = 2017. PSF
T. AIRSPEED= 108.3 KT TOTAL TEMP= 296.2 DEG K = 533.2 DEG R
A/C MACH NO= .162 STATIC TEMP= 294.7 DEG K = 530.4 DEG R

BODY ALPHA= 3.8 DEG DENSITY= 1.14 KG/M3 = .00222 SLUG/FT3
BODY BETA= 6.3 DEG DENSITY ALT= 724. M = 2375. FT
SONIC SPEED= 344.7 M/SEC = 1131. FPS
RATE OF CLIMB= -444. M/MIN = -1455. FPM

INERTIAL FLIGHT STATE

| AXIS | CG LIN VEL (M/S) | CG LIN VEL (FPS) | CG LIN ACC (G) | HUB LIN VEL (M/S) | HUB LIN VEL (FPS) | HUB LIN ACC (G) | AXIS | ANG POS (DEG) | ANG RATES (RAD/SEC) | ANG ACC (RAD/SEC2) |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 55.26 | 181.3 | -.040 | 55.01 | 180.5 | -.042 | ROLL | -32.5 | -.032 | .071 |
| Y | 6.08 | 19.9 | -.047 | 6.02 | 19.7 | -.029 | PITCH | -7.8 | .125 | .005 |
| Z | 3.71 | 12.2 | -1.508 | 3.72 | 12.2 | -1.504 | YAW | 75.4 | -.125 | -.025 |

CONTROL ANGLES M.R. COLL= 8.5 DEG HORIZ FIN= 7.4 DEG
A1= .9 DEG T.R. COLL= 4.4 DEG
B1= 5.0 DEG PEDAL POS= 5.2 DEG

ROTOR PARAMETERS ADVANCE RATIO= .243 SHAFT ALPHA= 3.9 DEG PER CENT RPM= 100.8
HOVER TIP MACH= .67 CONTROL ALPHA= -1.2 DEG RN/MACH= .146E+08

TIP MAX-MACH= .83 DELTA PSI= -6.2 DEG CLP= .00582
TIP MIN-MACH= .50
.9R MAX-MACH= .76
.9R MIN-MACH= .44 THRUST FACTOR= .850E+07 N = .191E+07 LB

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TABLE I.- BASIC AIRCRAFT CHARACTERISTICS

| | |
|---|---|
| Empty weight, N (lb.) | 27,050 (6080) |
| Fuel capacity, N (lb.) | 7,250 (1630) |
| Powerplant | Lycoming T53-L-13B |
| Nominal transmission limit at 100% rpm, kw (hp) | 820 (1100) |
| Wing: | |
| Airfoil | |
| Root | NACA 0030 |
| Tip | NACA 0024 |
| Semi-span (panel only), m (ft) | 1.09 (3.56) |
| Area (panels only), $m^2$ ($ft^2$) | 1.63 (17.6) |
| Chord: | |
| Root, m (ft) | 0.88 (2.89) |
| Tip, m (ft) | 0.62 (2.04) |
| Incidence angle (chord line), deg | 14.0 |
| Leading-edge sweep, deg | 15.2 |
| Dihedral angle, deg | 0.0 |
| Horizontal tail: | |
| Airfoil | inverted Clark Y |
| Semi-span (panel only), m (ft) | 0.78 (2.54) |
| Area (panels only), $m^2$ ($ft^2$) | 0.95 (10.2) |
| Chord: | |
| Root, m (ft) | 0.75 (2.45) |
| Tip, m (ft) | 0.54 (1.78) |
| Leading-edge sweep, deg | 19.9 |
| Dihedral angle, deg | 0.0 |
| Vertical tail: | |
| Airfoil | |
| Root | cambered, 14% thick |
| Tip | cambered, 15% thick |
| Span (above tail boom), m (ft) | 1.64 (5.38) |
| Area, $m^2$ ($ft^2$) | 1.73 (18.6) |
| Chord: | |
| Root, m (ft) | 1.42 (4.67) |
| Tip, m (ft) | .69 (2.25) |
| Leading-edge sweep, deg | 50.0 |
| Twist, deg | nonlinear |

TABLE I.- Concluded

| | |
|---|---|
| **Main Rotor:** | |
| Number of blades | 2 |
| Airfoil | 9.3% thick symmetrical |
| Radius (R), m (ft) | 6.706 (22.0) |
| Chord, m (ft) | 0.686 (2.25) |
| Taper | 1:1 |
| Solidity | 0.0651 |
| Twist, deg | -10/R |
| Flapwise inertia, kg-m$^2$ (slug-ft$^2$) | 1878 (1385) |
| Lock number | 5.19 |
| Nominal tip speed, m/sec (ft/sec) | 227.5 (746.6) |
| Hub precone angle, deg. | 2.75 |
| Pitch-flap coupling ($\delta_3$), deg | 0.0 |
| Blade pitch range at .75 R, deg | -12, +40 |
| Trim tab - | |
| Width, m (ft) | 0.154 (0.504) |
| Overhang length, m (ft) | 0.044 (0.144) |
| In-board edge | 0.865R |
| **Tail Rotor:** | |
| Number of blades | 2 |
| Airfoil | NACA 0015 |
| Radius, m (ft) | 1.295 (4.25) |
| Chord, m (ft) | 0.214 (0.70) |
| Taper | 1:1 |
| Solidity | 0.105 |
| Twist, deg | 0.0 |
| Equivalent root cut-out, percent | 20 |
| Nominal tip speed | 227.5 (746.4) |
| Hub precone angle, deg | 1 |
| Pitch-flap coupling ($\delta_3$), deg | 30 |
| Blade pitch range, deg | -10.6, +18.3 |

TABLE II. - "540" AIRFOIL COORDINATES

| x/c | ±y/c |
|---|---|
| 0 | 0 |
| .00207 | .00681 |
| .00770 | .01319 |
| .01170 | .01600 |
| .01941 | .02030 |
| .02756 | 02356 |
| .03881 | .02770 |
| .05452 | 03185 |
| 07778 | .03644 |
| .10889 | 04074 |
| 15556 | 04474 |
| 23333 | .04667 |
| 31111 | 04504 |
| 39911 | 04059 |
| 1 00000 | 00104 |

Note: Airfoil has straight-line contours between x/c = 0.39911 and 1.0 for each surface

TABLE III. - PADS-PCM DATA SYSTEM CHARACTERISTICS

| Parameter | System Accuracy (a) | Digital Channel Precision | Filter (b) Frequency |
|---|---|---|---|
| Aerodynamic Flight State: | | | |
| dynamic pressure - regular | 70 Pa | 14 Pa | 1 Hz |
| - sensitive | 14 Pa | 3 Pa | — |
| static pressure - regular | 500 Pa | 200 Pa | — |
| -sensitive | 70 Pa | 40 Pa | |
| angle of attack | $.1^{0}$ | $.18^{0}$ | 10 Hz |
| angle of sideslip | $.1^{0}$ | $.18^{0}$ | 10 Hz |
| total temperature | $.06^{0}$C | $.1^{0}$C | — |
| Inertial Flight State: | | | |
| roll attitude | $.5^{0}$ | $.36^{0}$ | — |
| pitch attitude | $.5^{0}$ | $.18^{0}$ | — |
| heading | $3.0^{0}$ | $.72^{0}$ | — |
| angular rates | .01 rad/sec | .044 rad/sec | 10 Hz |
| longitudinal acceleration | .001 g | .004 g | 10 Hz |
| lateral acceleration | .001 g | .003 g | 10 Hz |
| normal acceleration | .005 g | .009 g | 10 Hz |
| Control Positions: | | | |
| lateral servo ($\delta_1$) | $.1^{0}$ | $.04^{0}$ | 10 Hz |
| longitudinal servo ($\delta_2$) | $.1^{0}$ | $.07^{0}$ | 10 Hz |
| collective servo ($\delta_0$) | $.1^{0}$ | $.05^{0}$ | 10 Hz |
| horizontal fin | $.1^{0}$ | $.02^{0}$ | 10 Hz |
| pedal position | $.16^{0}$ | $.07^{0}$ | 10 Hz |
| tail-rotor collective | $.1^{0}$ | $.07^{0}$ | 10 Hz |
| Rotor/Engine Parameters: | | | |
| main-rotor speed - regular | .5% | .23% | — |
| -sensitive | .1% | .05% | — |
| main-rotor azimuth | $1^{0}$ | $22.5^{0}$ | — |
| engine torque pressure | 3 kPa | 1.3 Pa | — |
| fuel quantity | 60 | 40 | |

Notes: a - accuracy of analog signal before digitization

b - frequency at 3 db roll-off for constant delay, 4 pole Bessel Filters

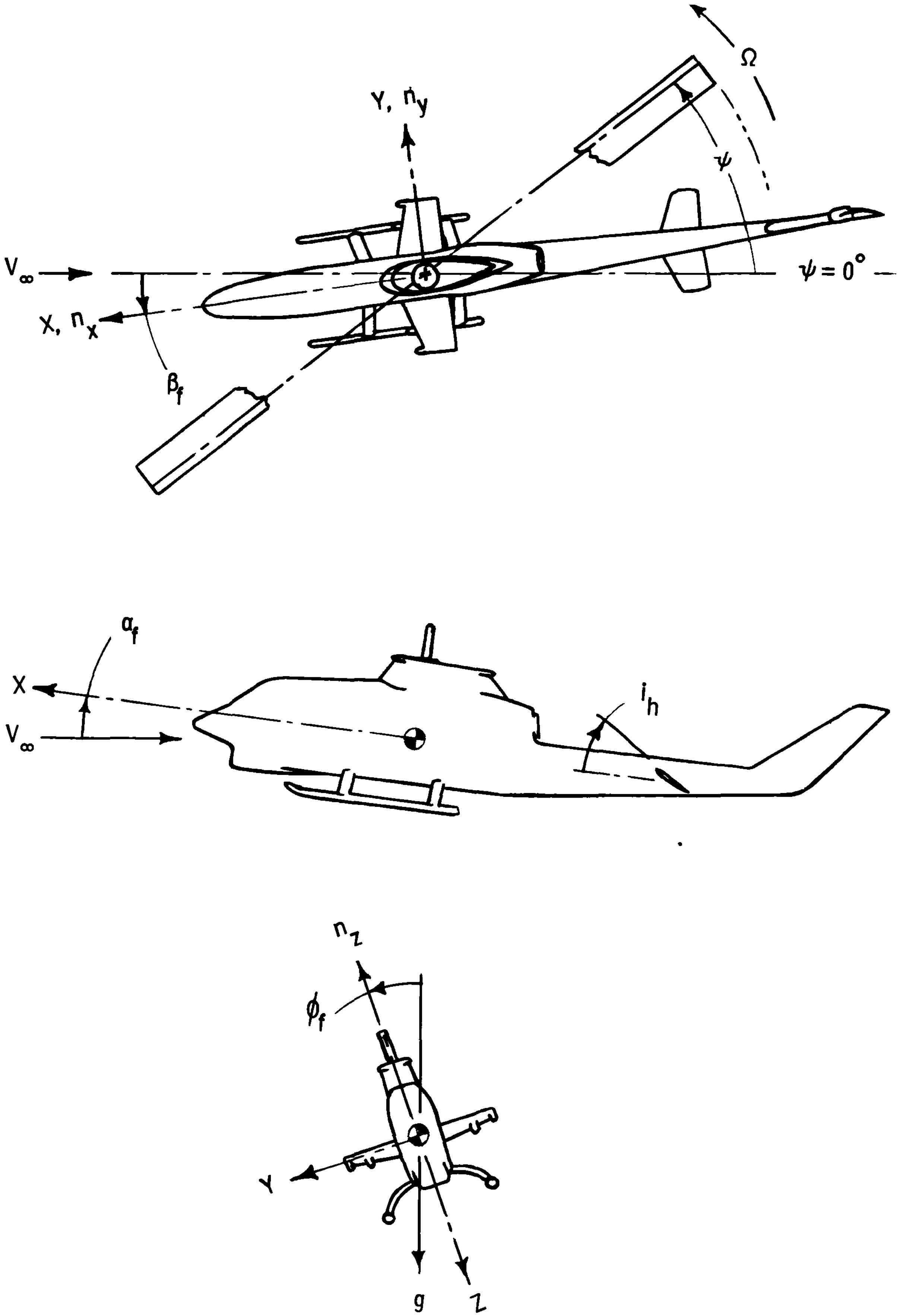



Figure 1.- Aircraft schematic and conventions used to define positive sense of motions, loads and angles.

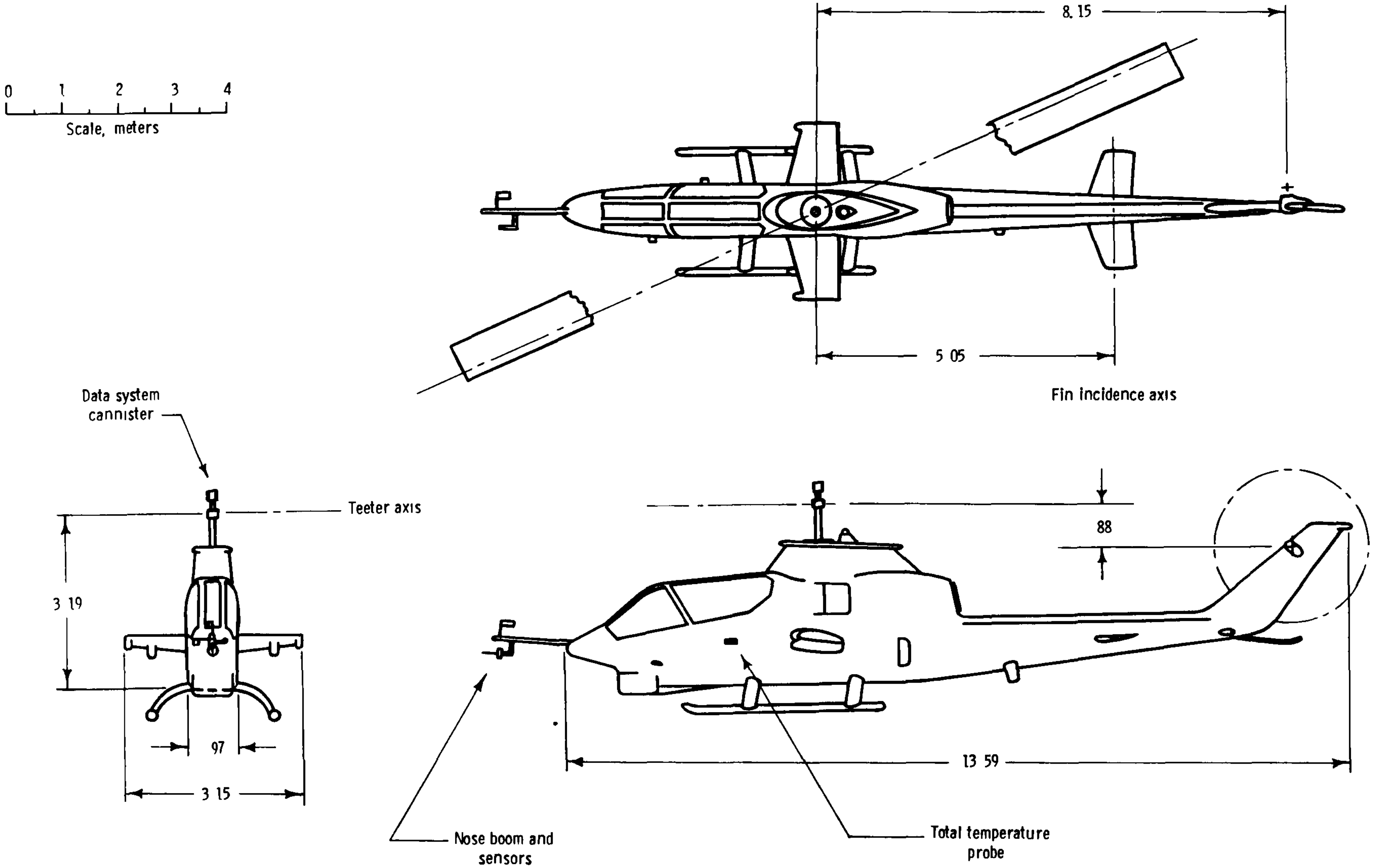



Figure 2.- Three-view scale drawing of aircraft. All dimensions are given in meters.

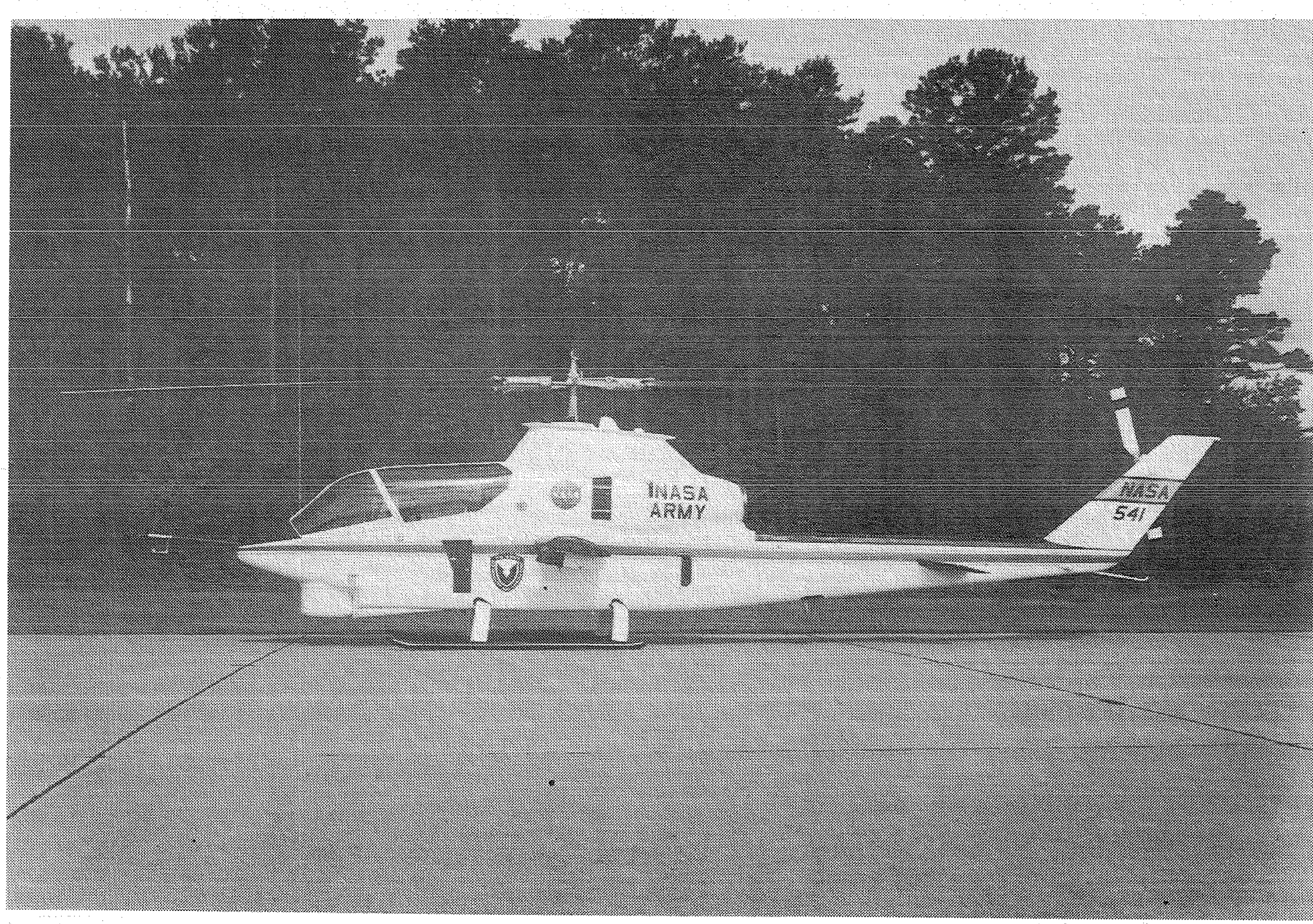



Figure 3.- Flight test vehicle.

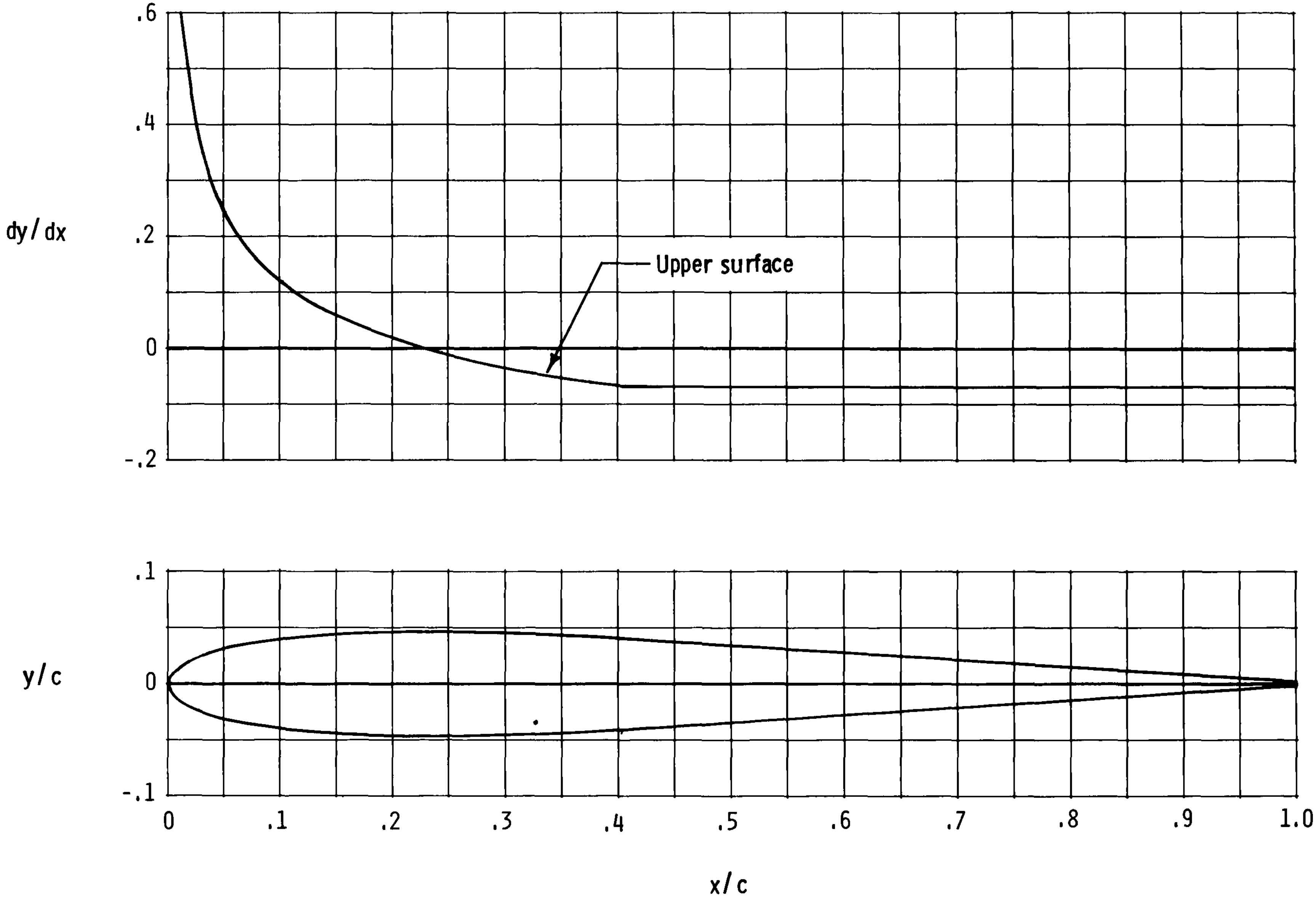



Figure 4.- Profile and surface-slope distribution of BHC 540 airfoil.

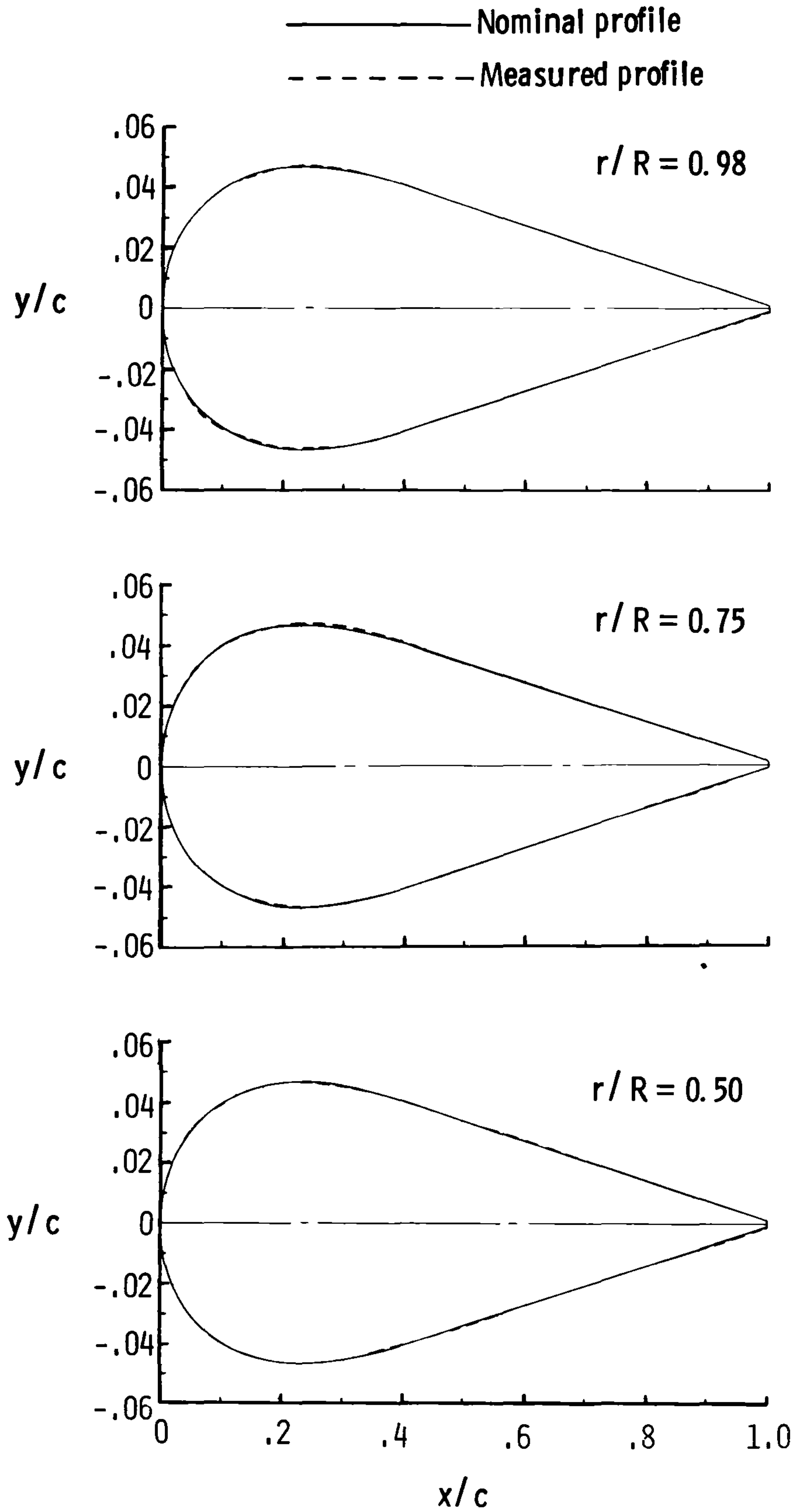
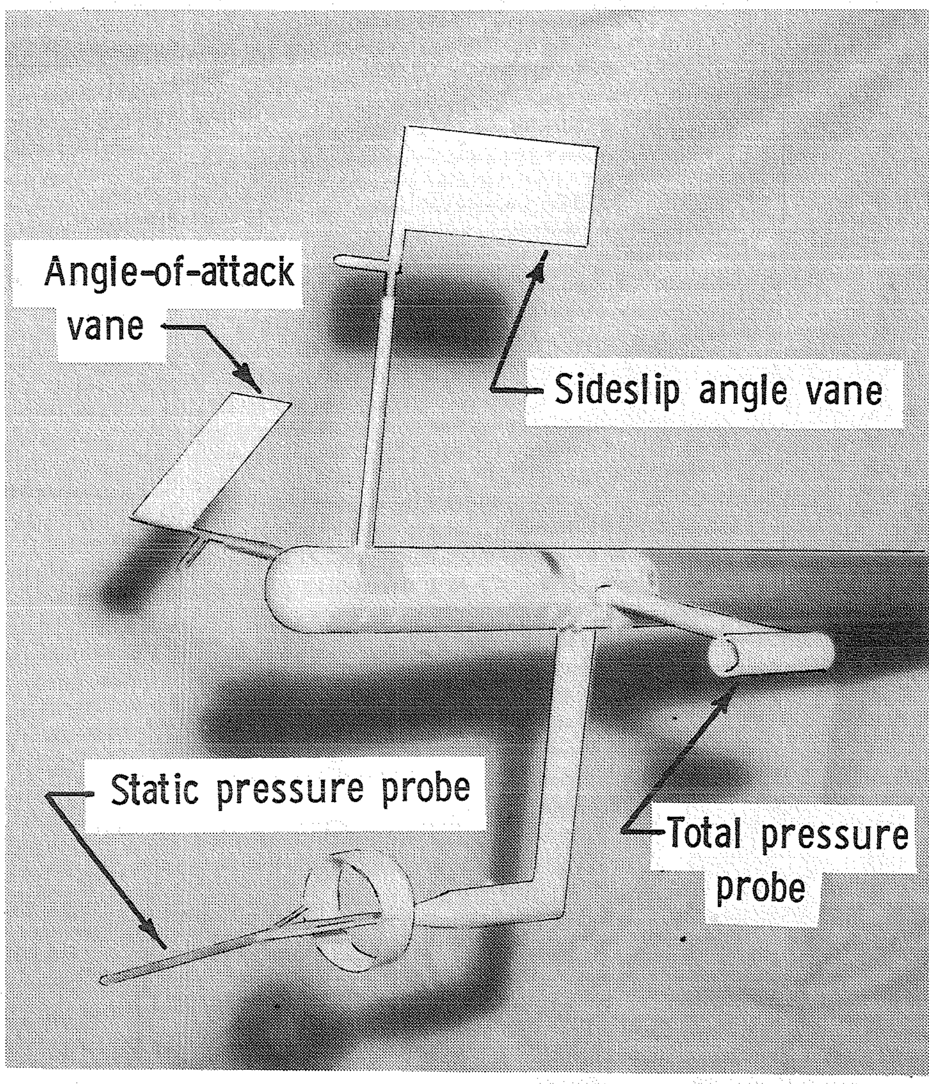
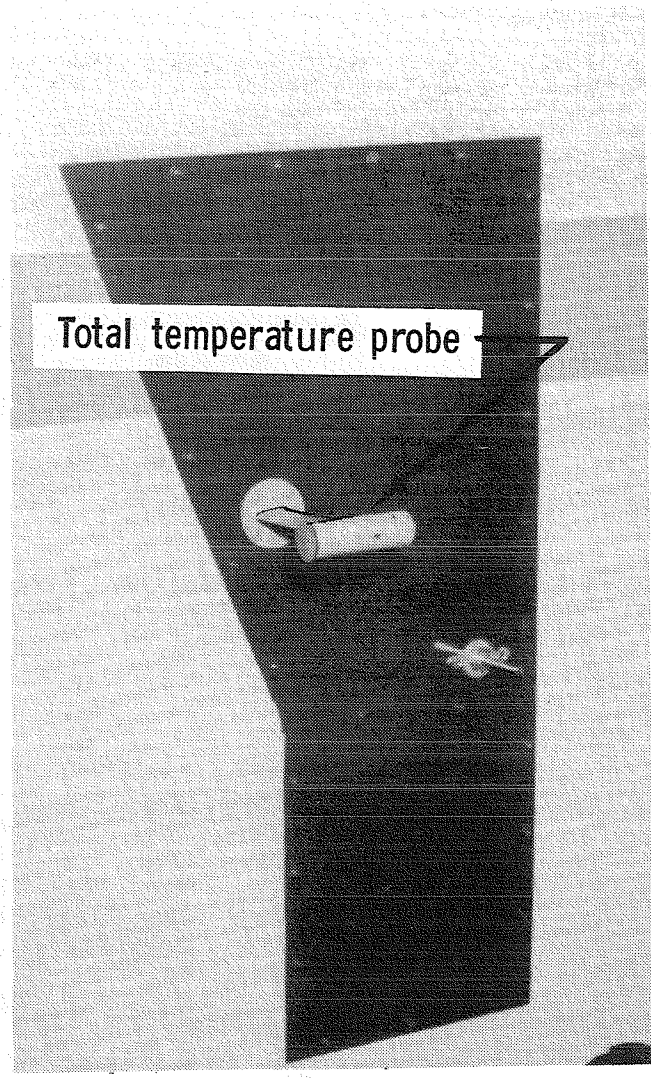



Figure 5.- Comparison of nominal and measured airfoil coordinates of main-rotor blade.




(a) Nose-boom sensors.




(b) Temperature sensors.

Figure 6.- PADS PCM instrumentation.

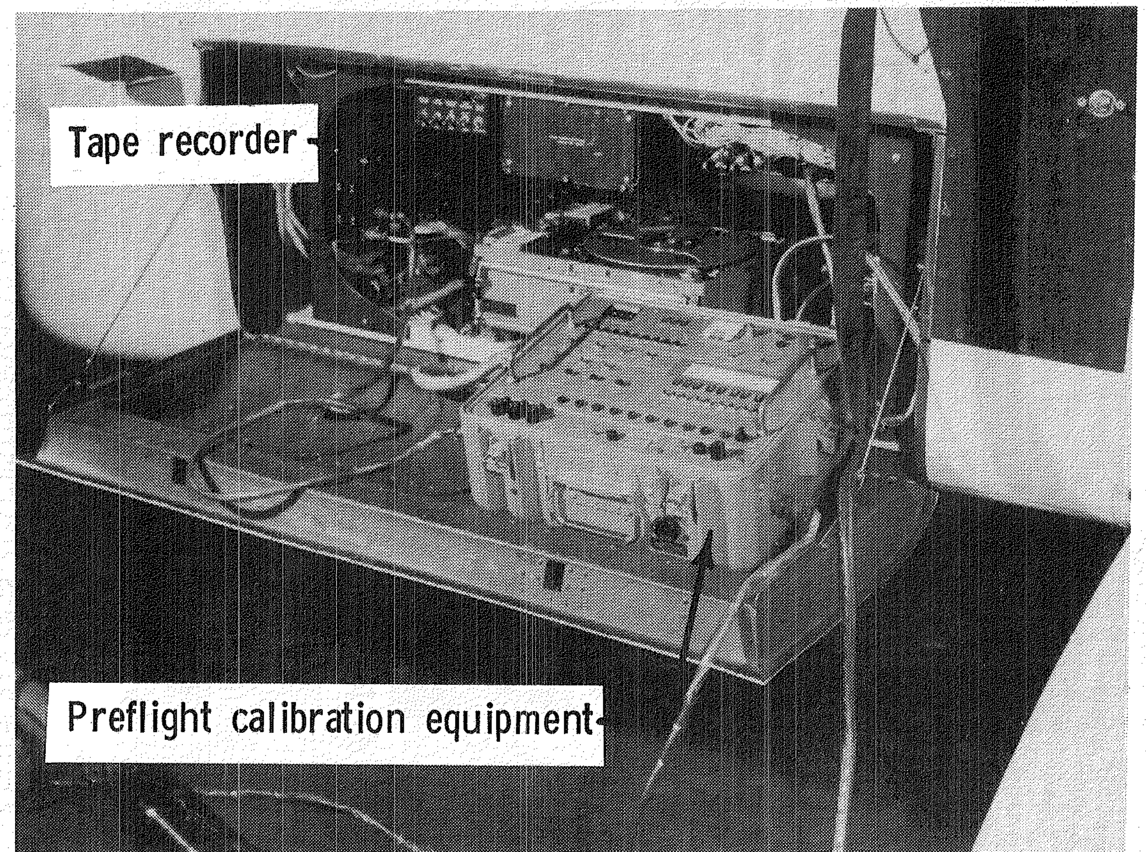
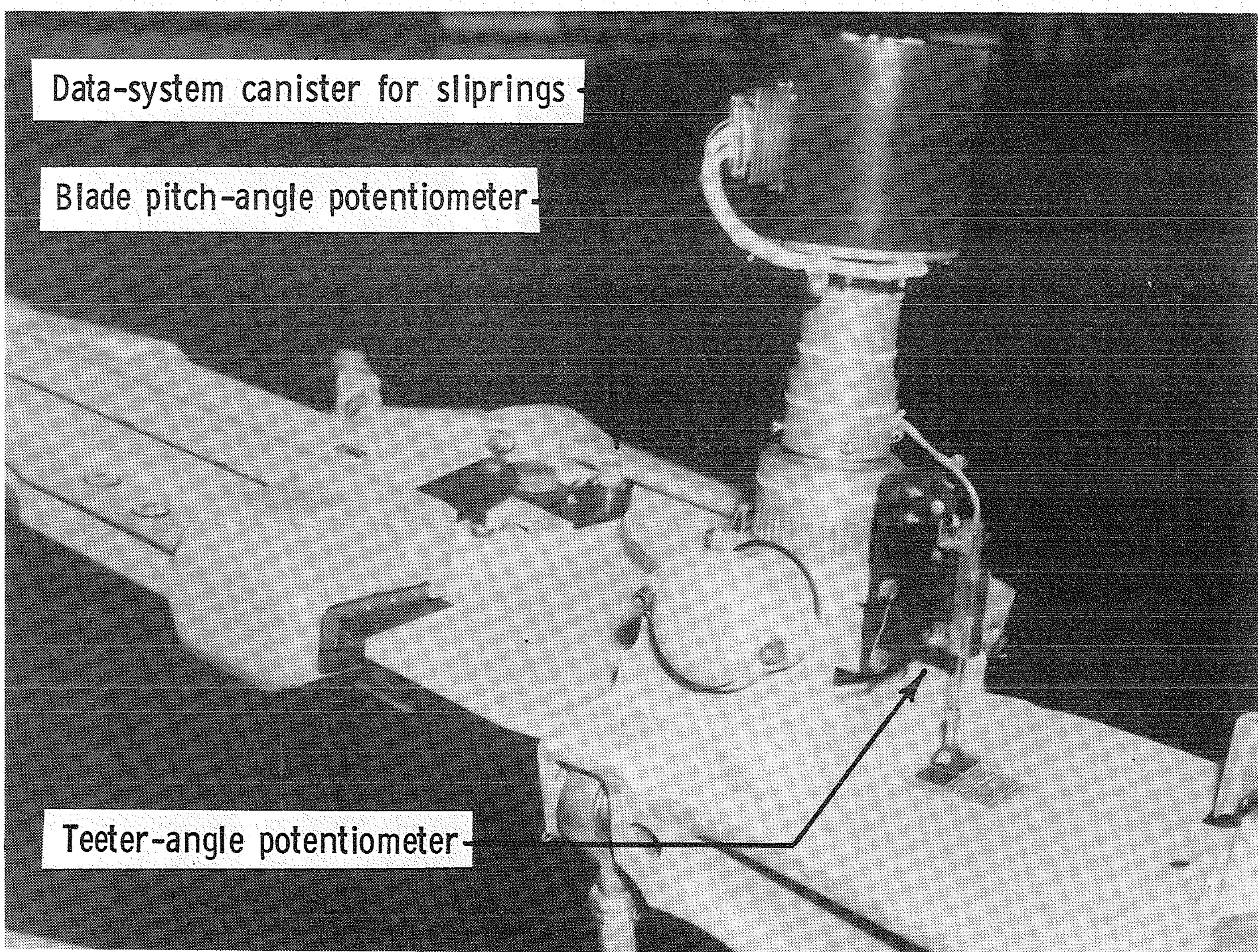
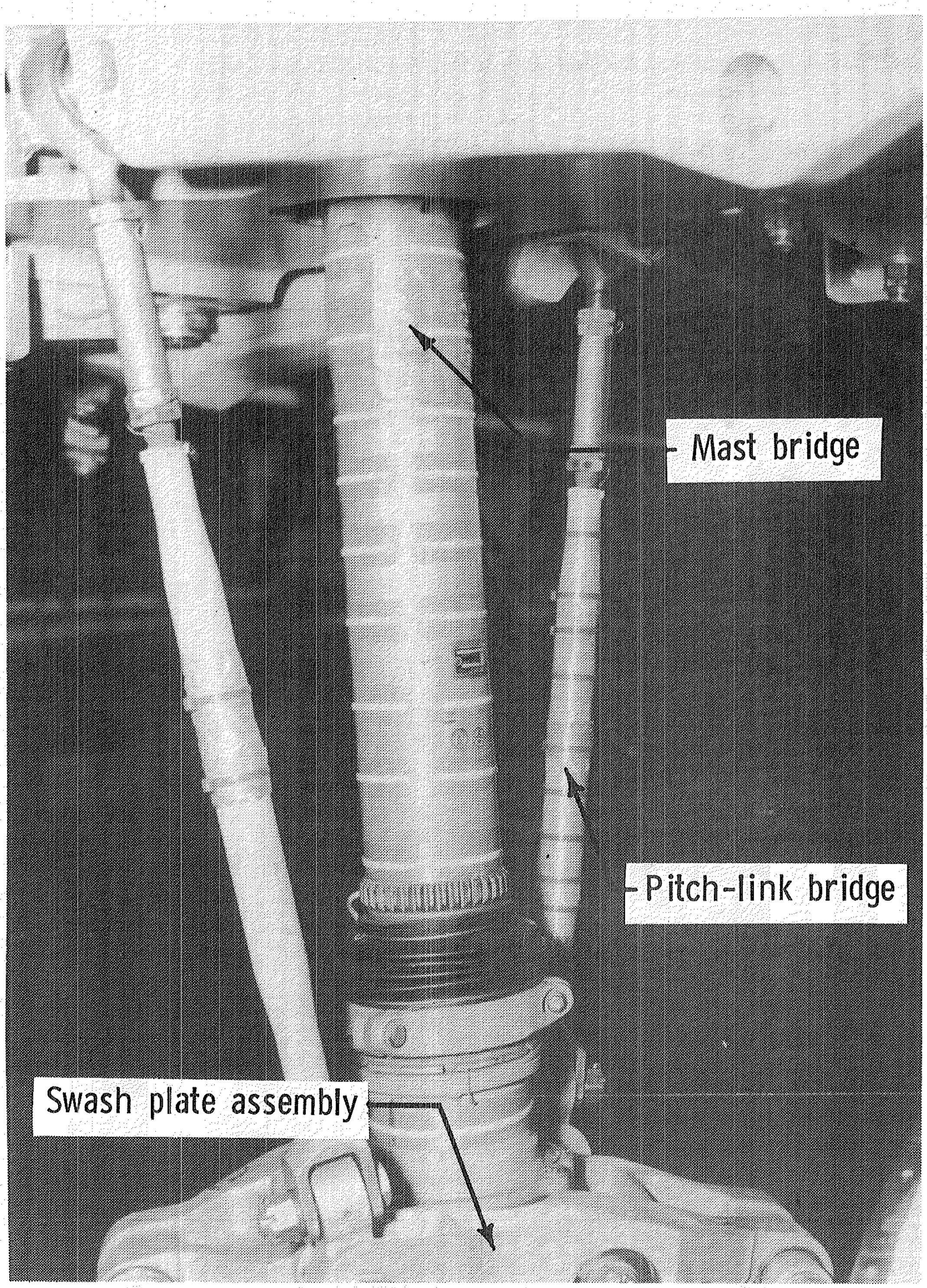



Figure 7.- PADS data system in aircraft ammunition bay.



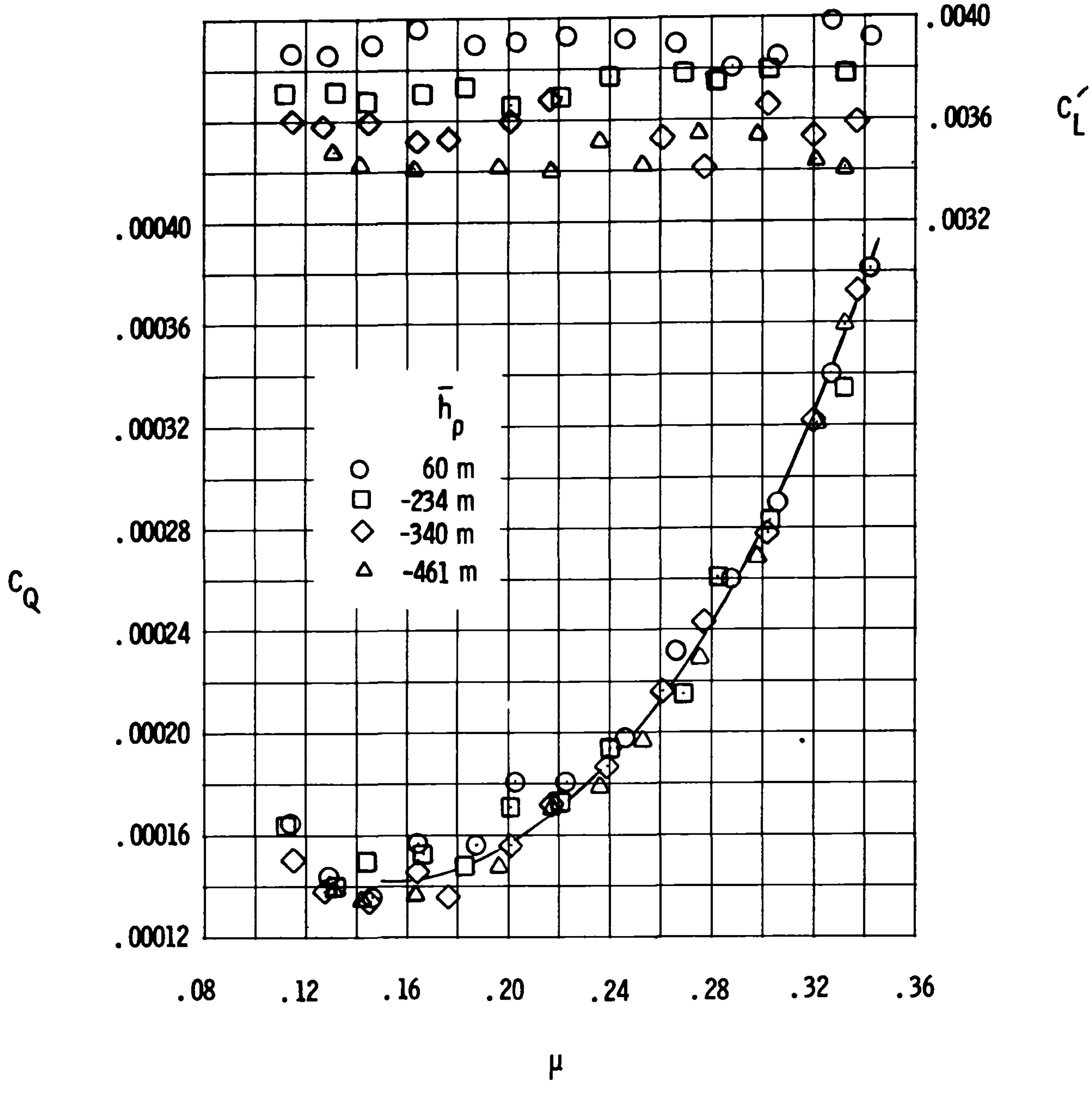

(a) Potentiometers and data-system canister

Figure 8.- PADS FM instrumentation.



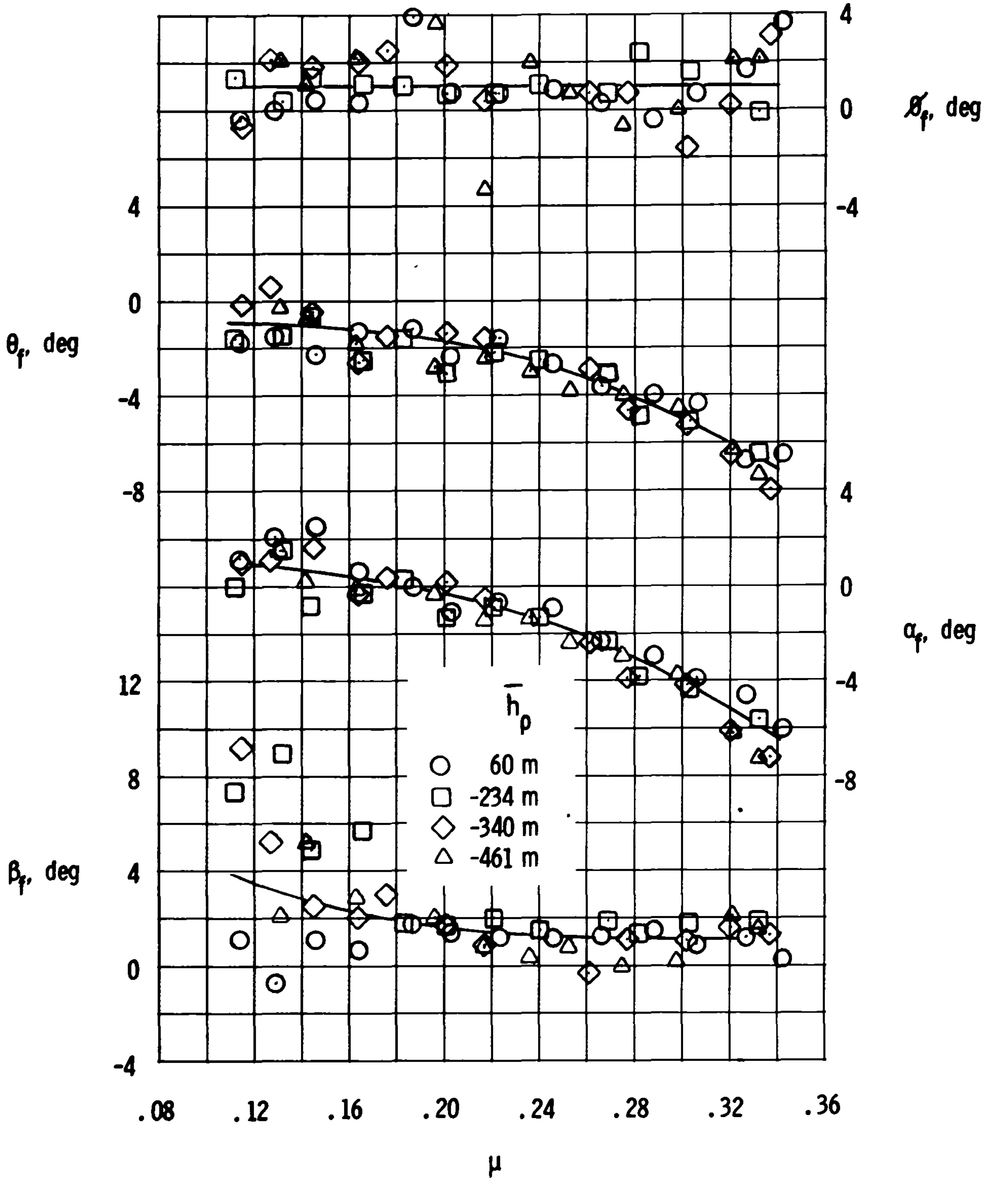

(b) Strain-guage bridge locations

Figure 8.- Concluded.



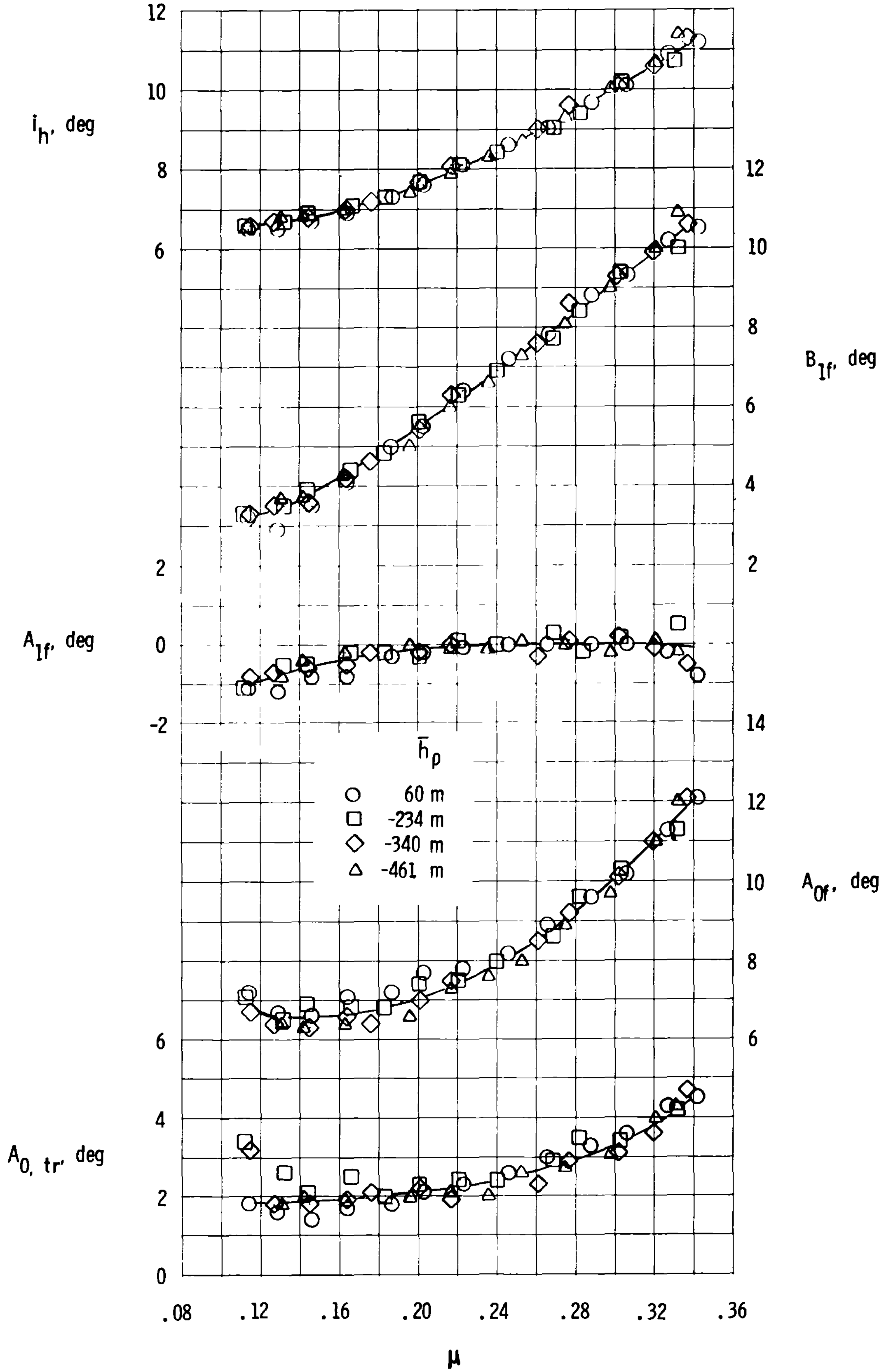

(a) Vehicle load and mast torque coefficients.

Figure 9.- Flight data for four consecutive level-flight speed sweeps. $\overline{M}_h = 0.69$.



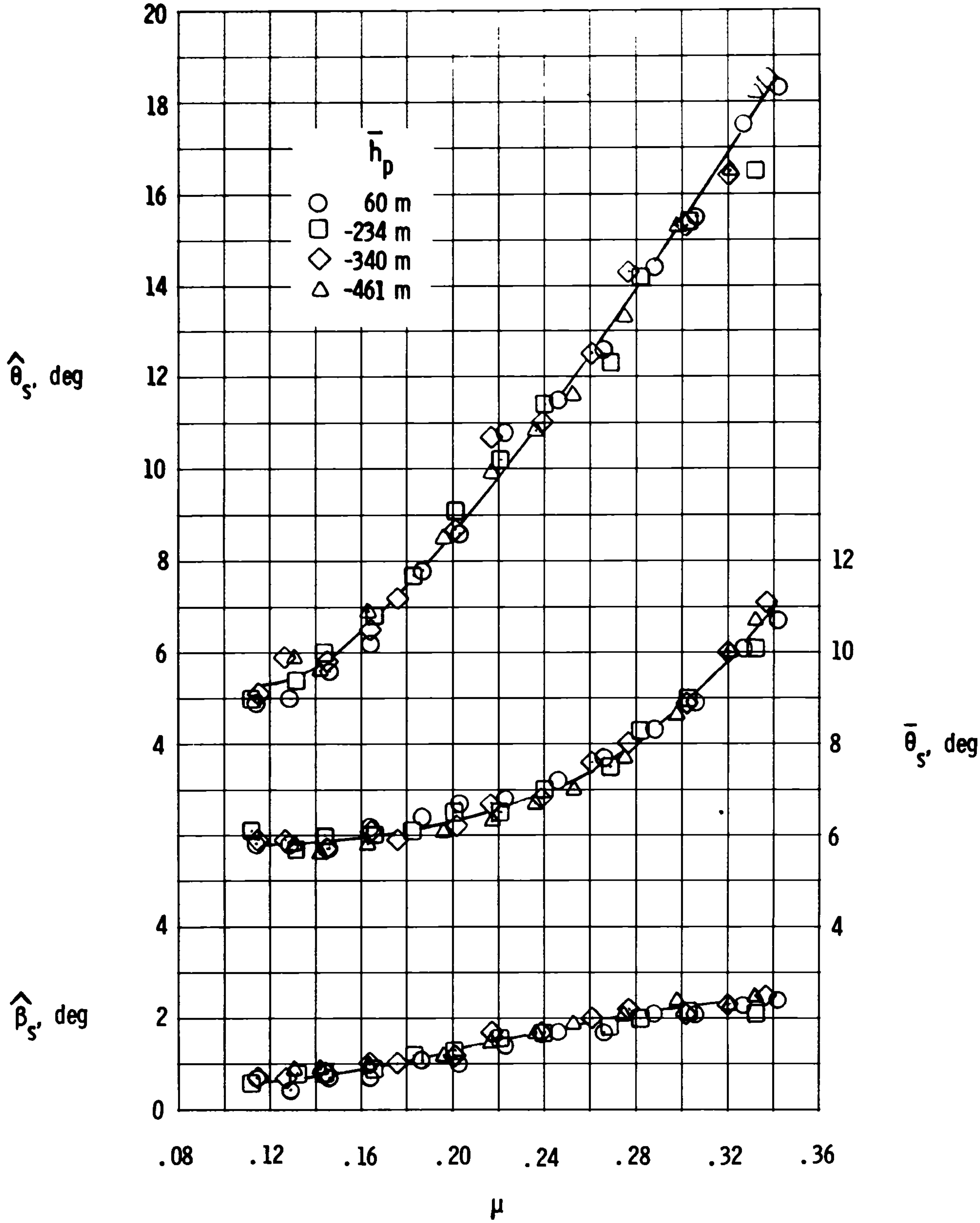

(b) Aircraft attitude

Figure 9.- Continued.



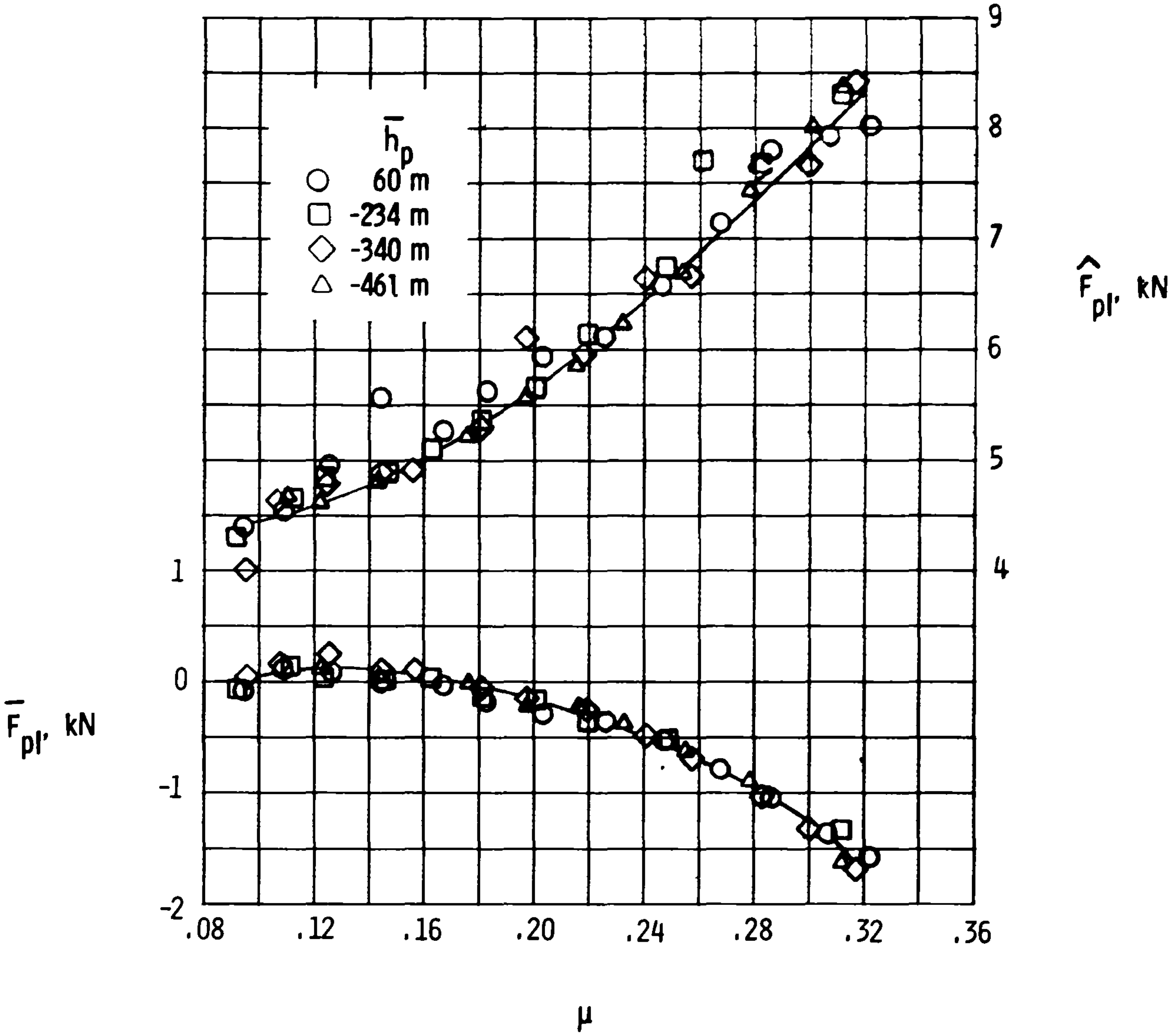

(c) Control parameters

Figure 9.- Continued.



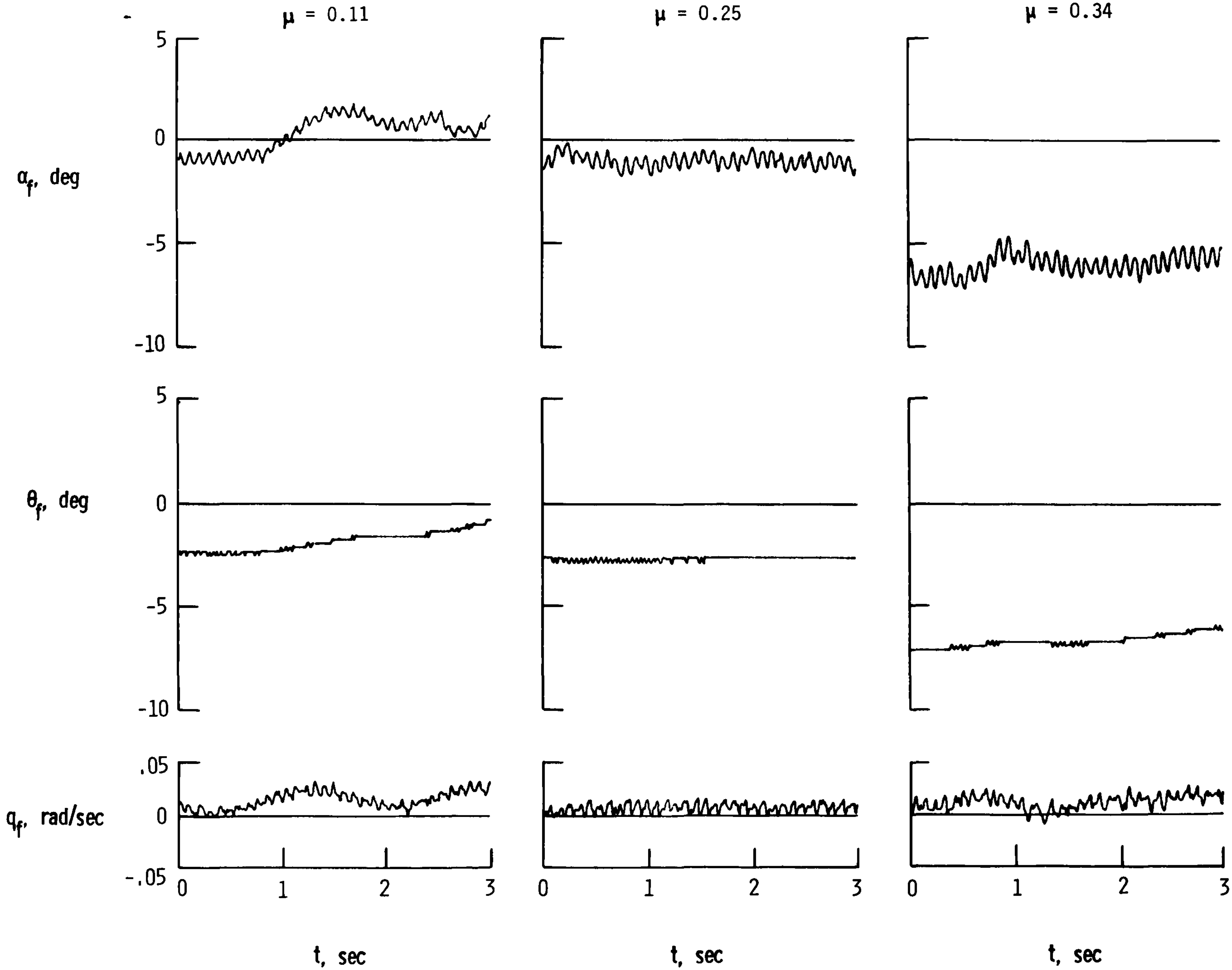

(d) Rotor-blade pitch and teeter angles.

Figure 9.- Continued.



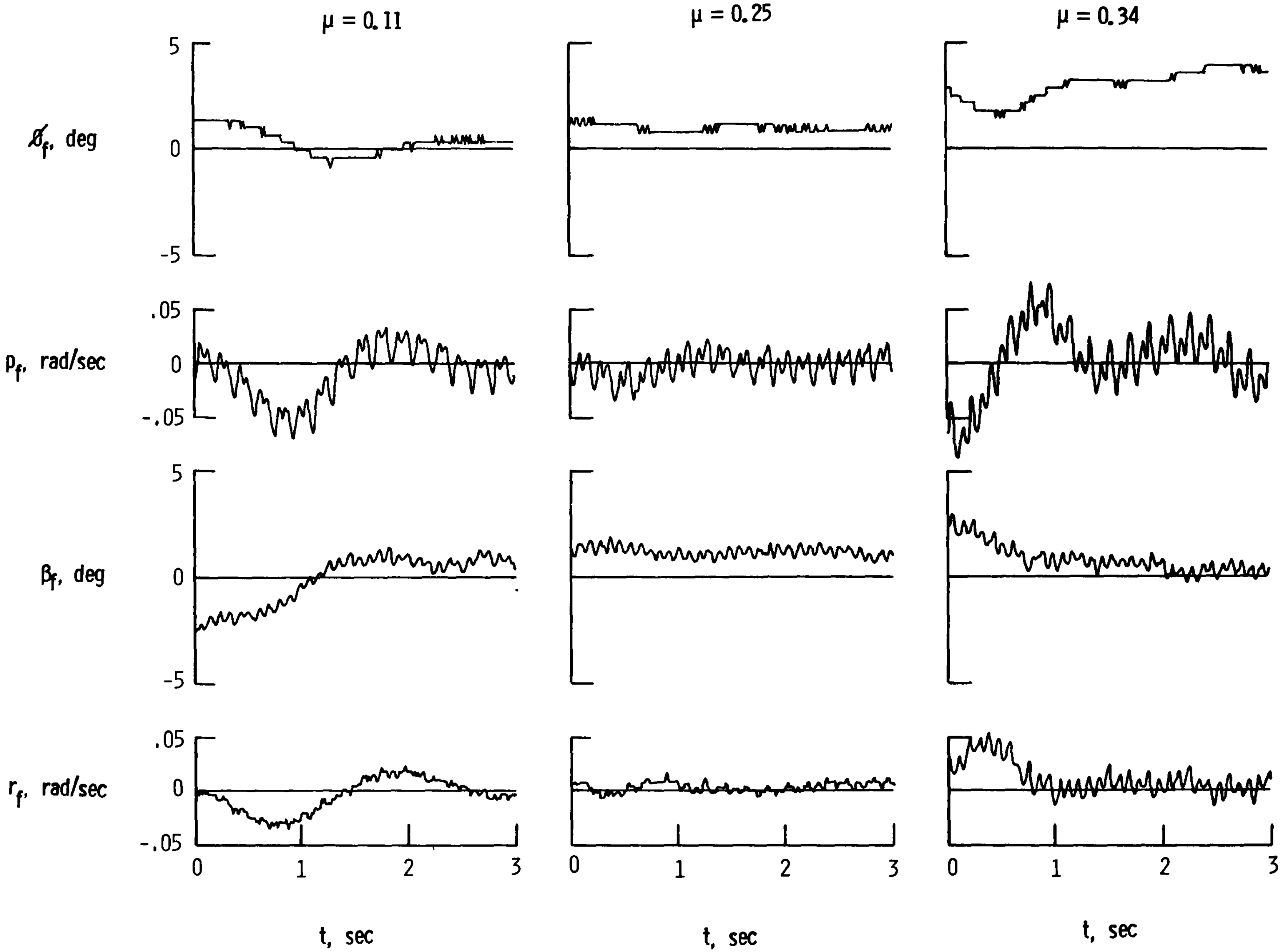

(e) Mean and peak-to-peak pitch-link loads

Figure 9.- Concluded.



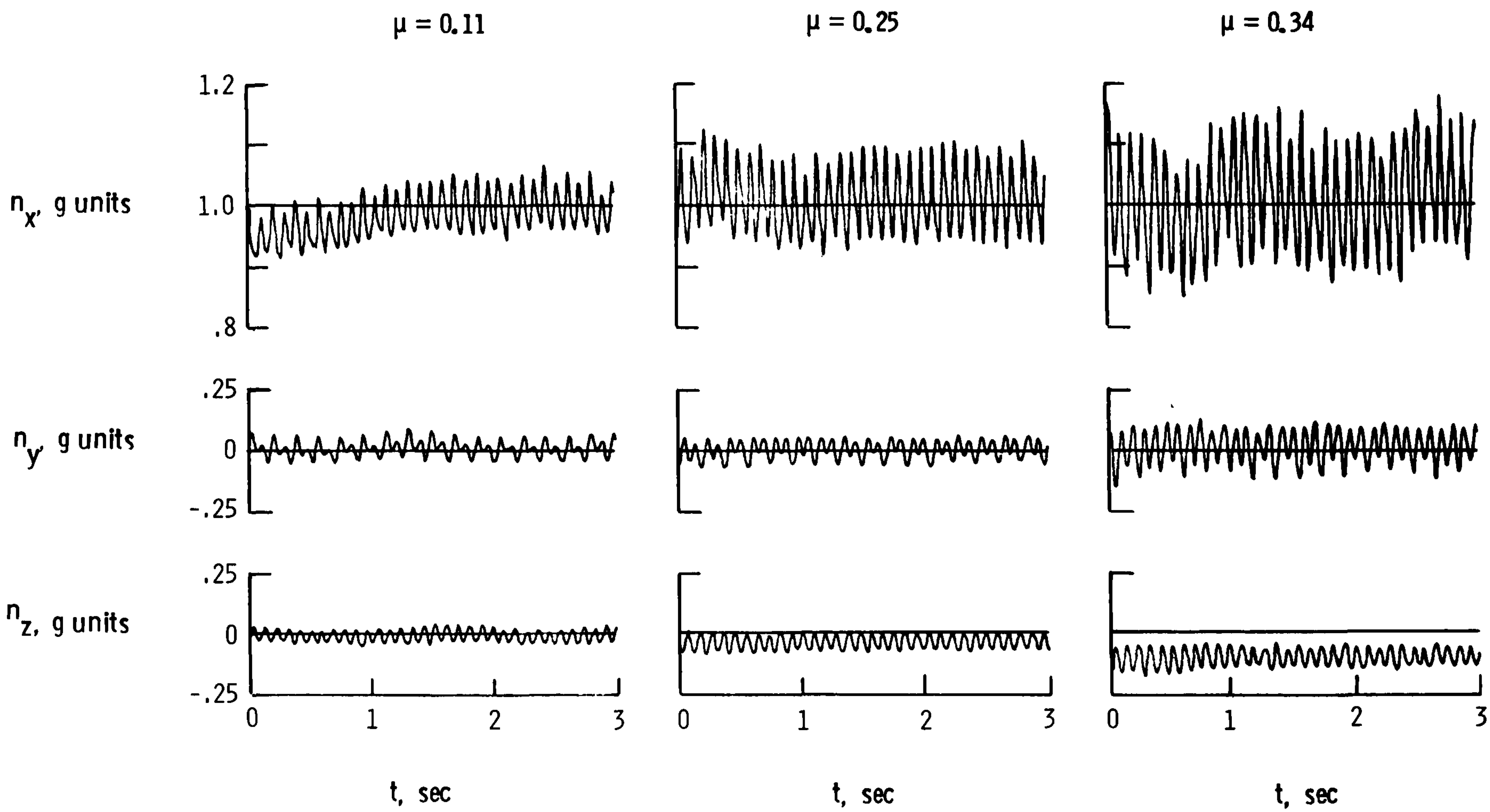

(a) Longitudinal parameters.

Figure 10.- Vehicle flight-state histories for three level-flight test points (Flight 11, runs 1, 8 and 13 of Appendix C); measured, uncorrected parameters.




(b) Lateral parameters

Figure 10.- Continued.




(c) Acceleration components

Figure 10.- Concluded.

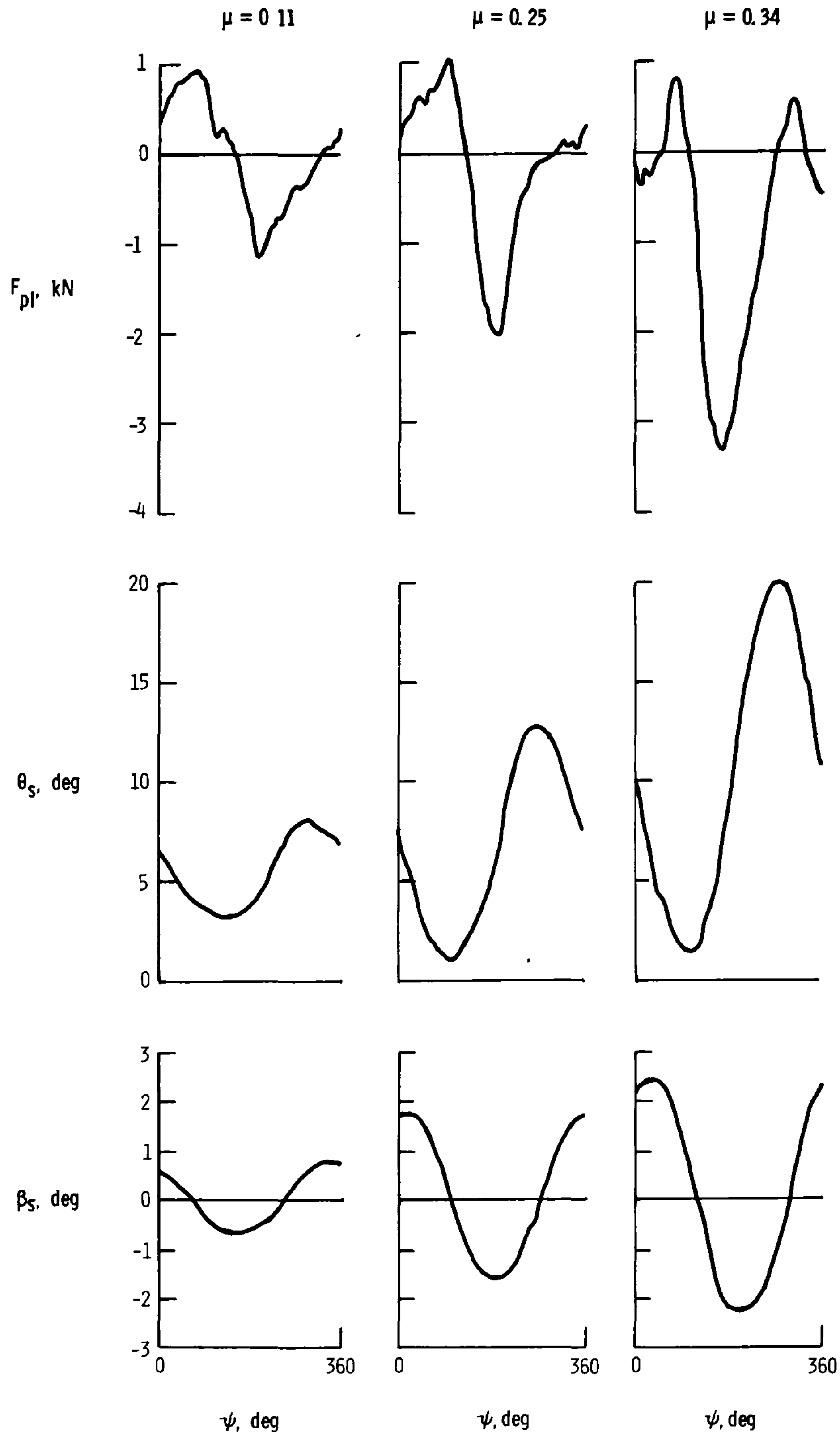



Figure 11.- Rotor-data records for three level-flight test points (Flight 11, runs 1, 8, and 13 of Appendix C).

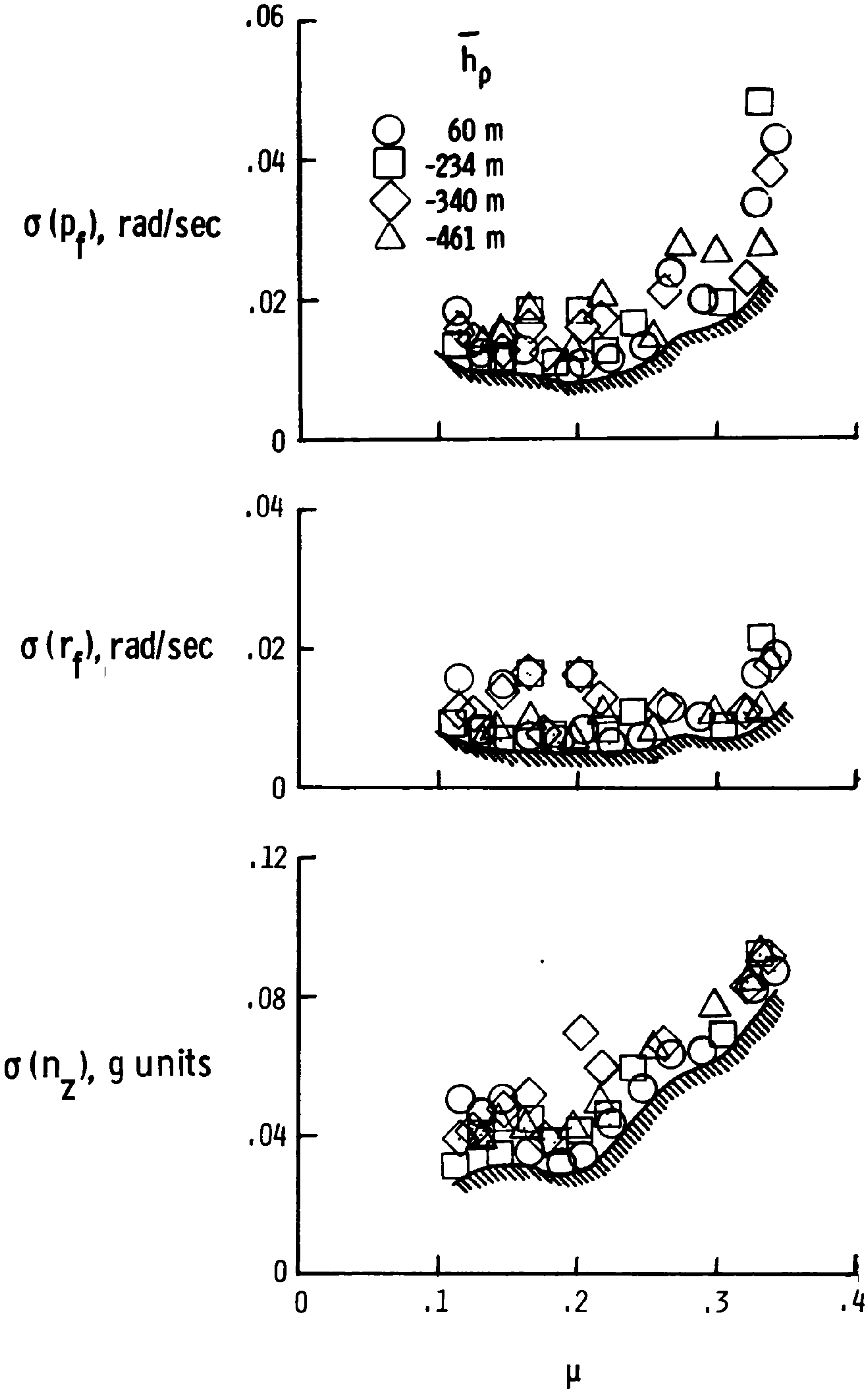



Figure 12.- Standard deviation of three measured, uncorrected, flight-state parameters for 12 second record at test-point condition. (Flight 11, runs 1-50 of Appendix C).

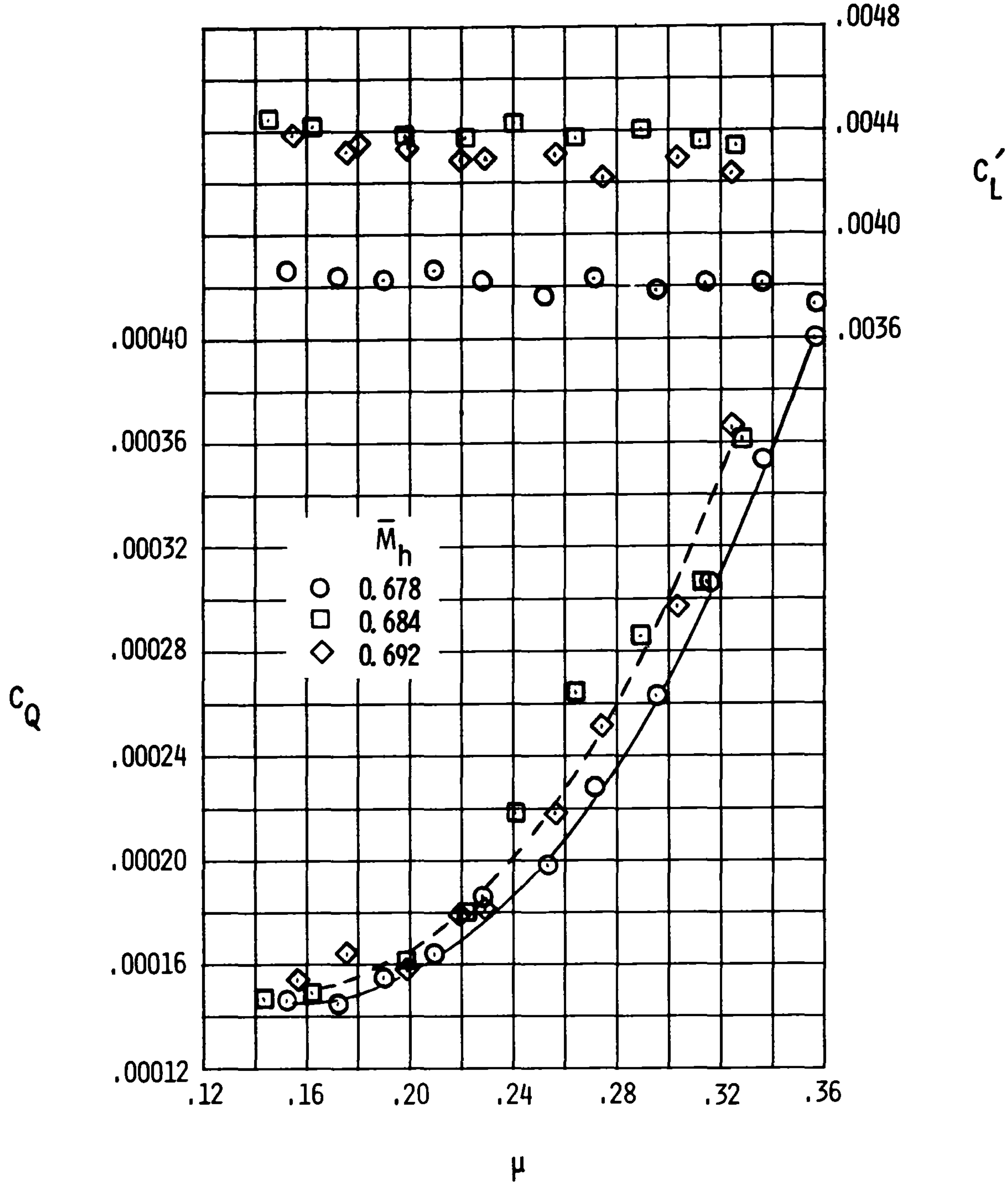



Figure 13.- Performance data for minimal test-point period.

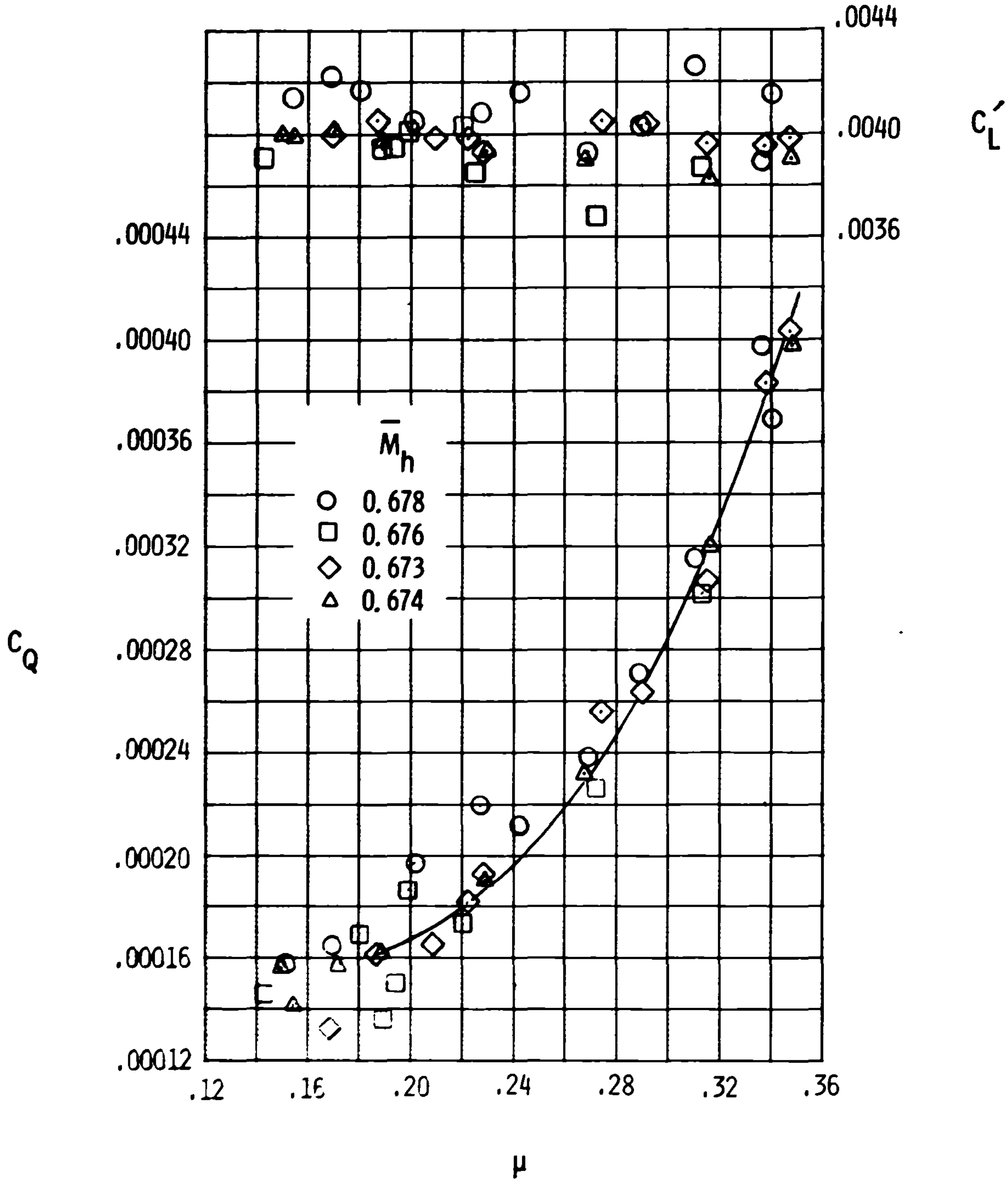



Figure 14.- Performance data for nominal seven-second test-point period.

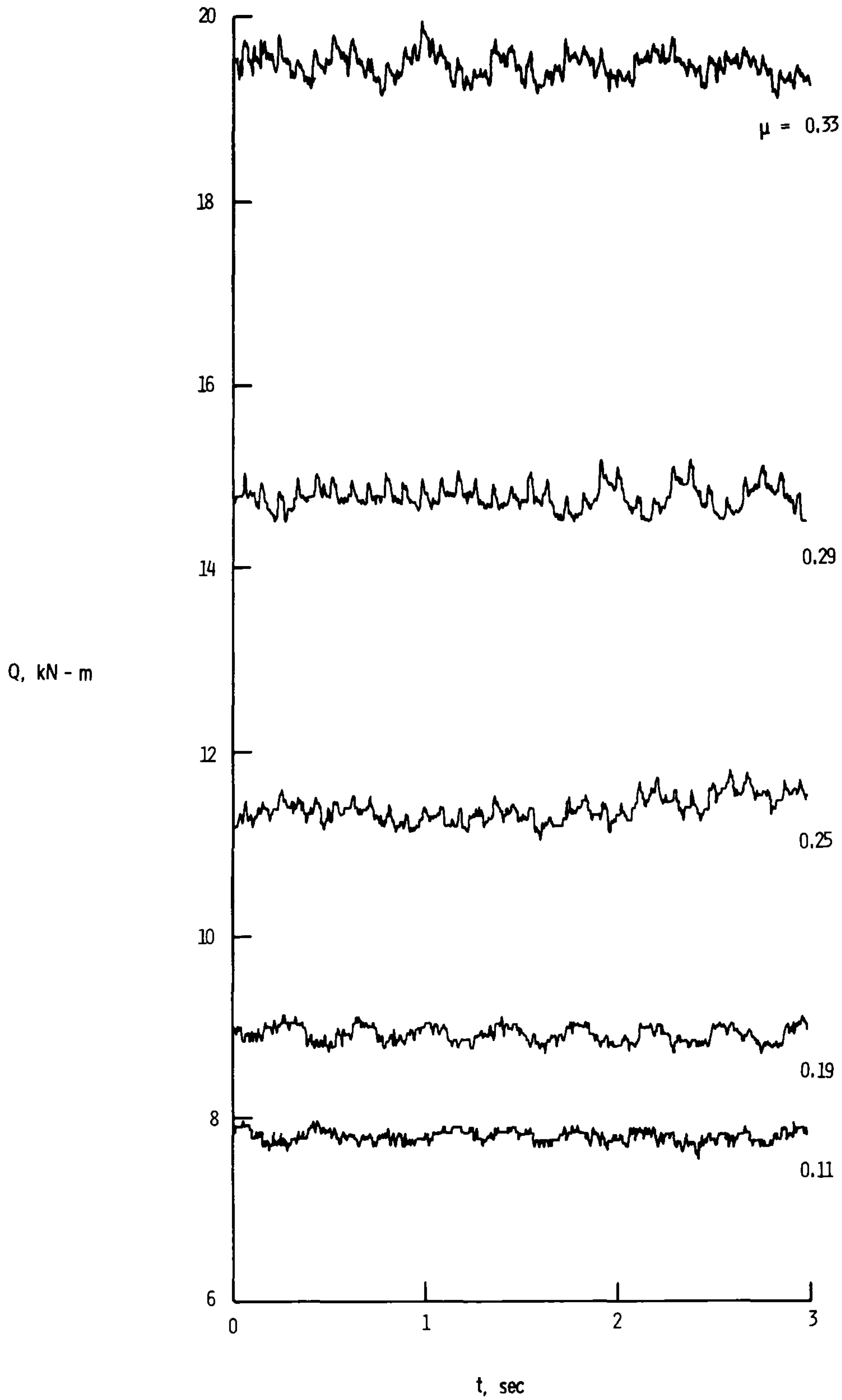
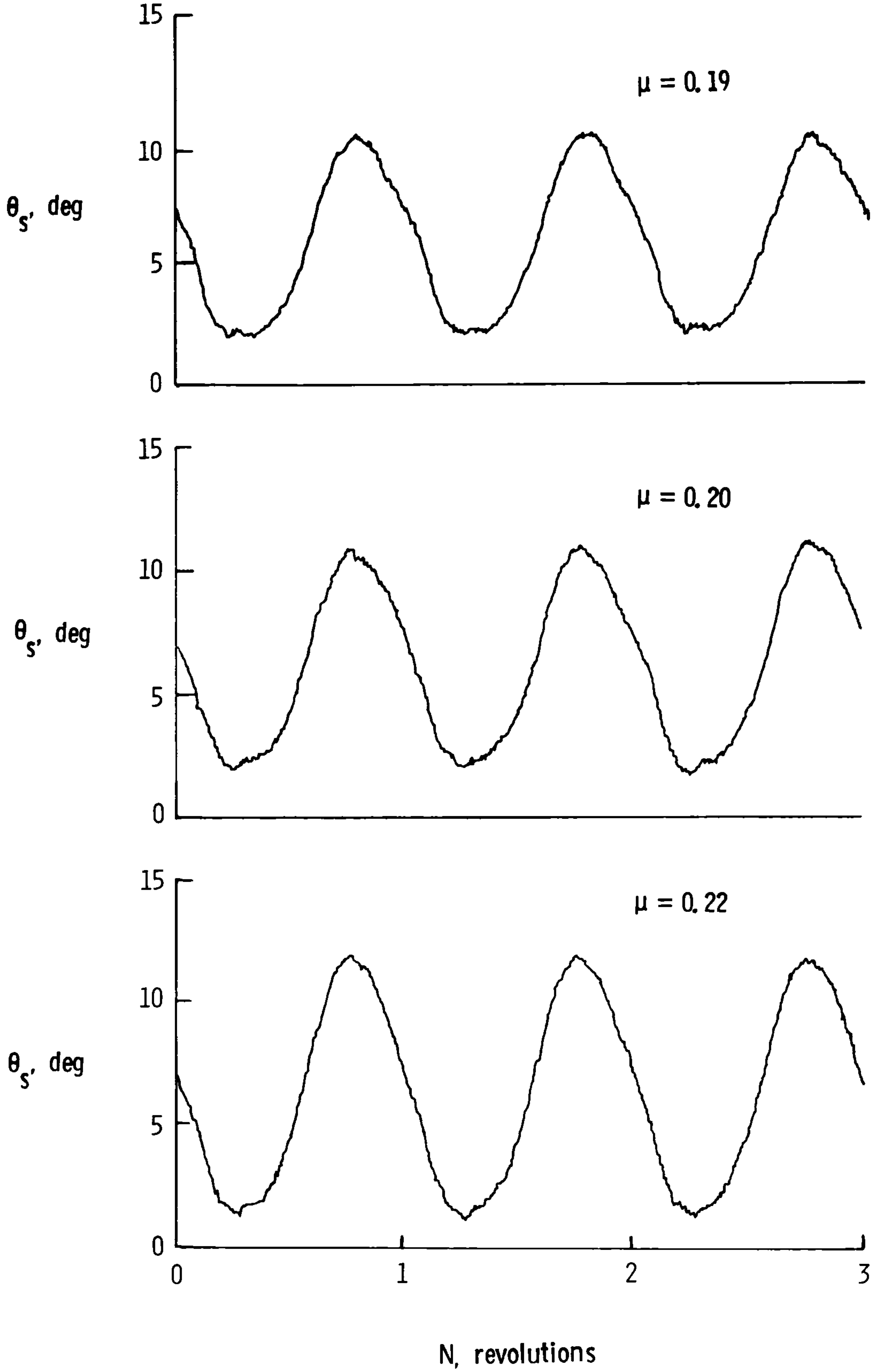
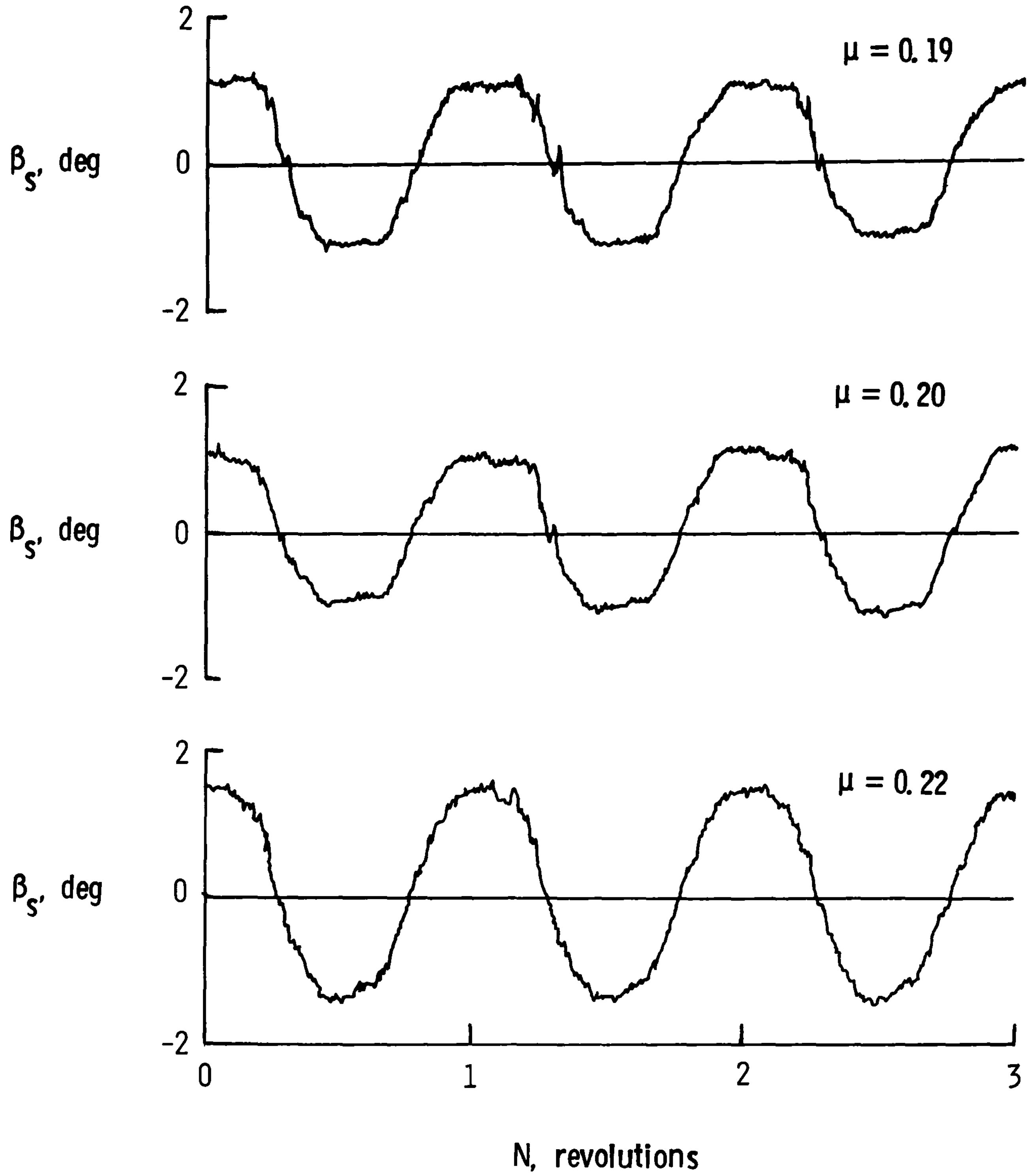



Figure 15.- Mast-torque histories for level-flight test points.
$\overline{M}_h = 0.69$; $\overline{C}_L' = 0.0039$.




(a) Blade pitch angle

Figure 16.- Blade-motion histories for level-flight test points. $\overline{M}_h = 0.69$; $\overline{C}_L = 0.0039$.




(b) Blade teeter angle

Figure 16.- Concluded.

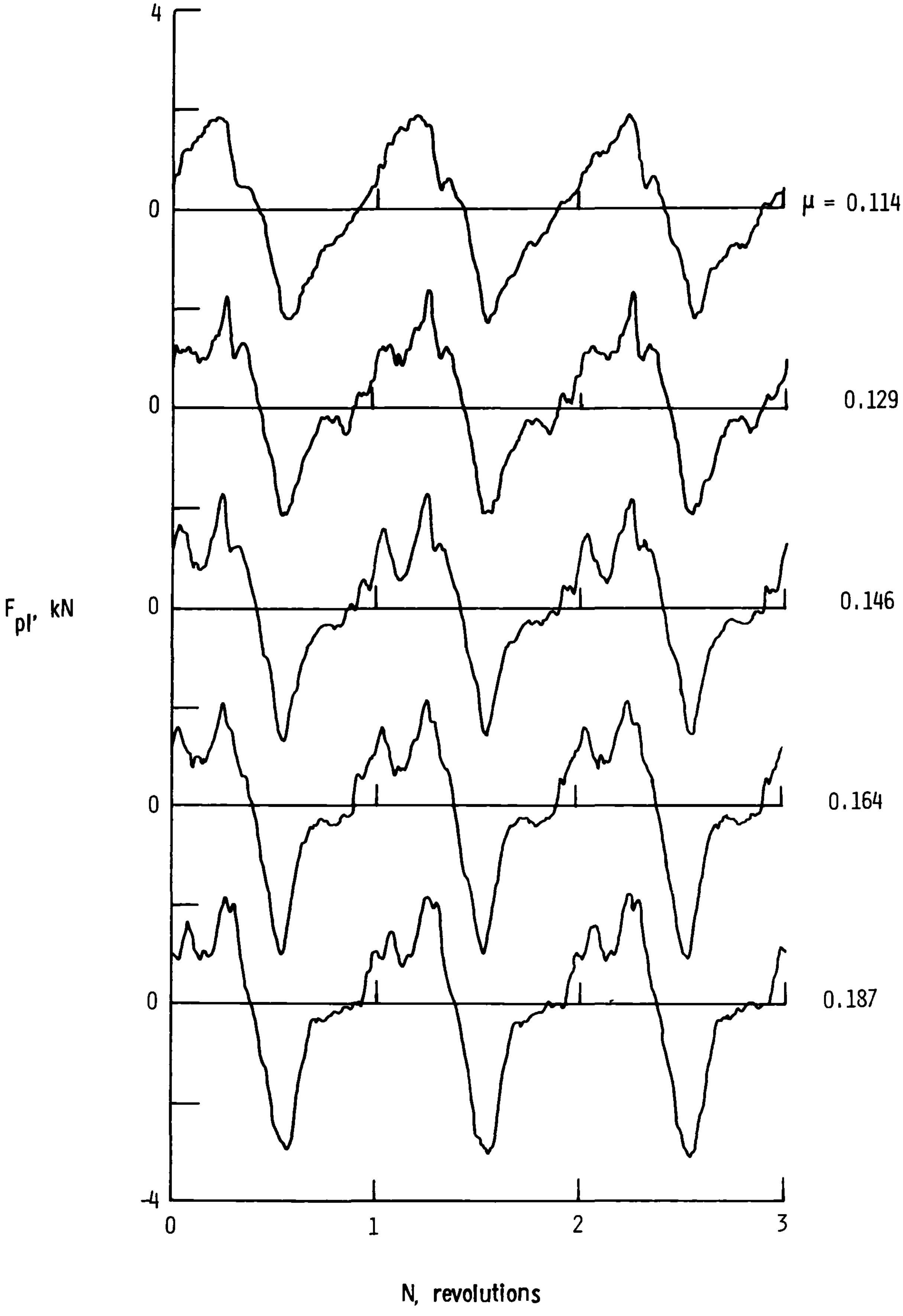



Figure 17.- Pitch-link load histories for level-flight test points. $\overline{M}_h$ = 0.69; $\overline{C}_L'$ = 0.0039.

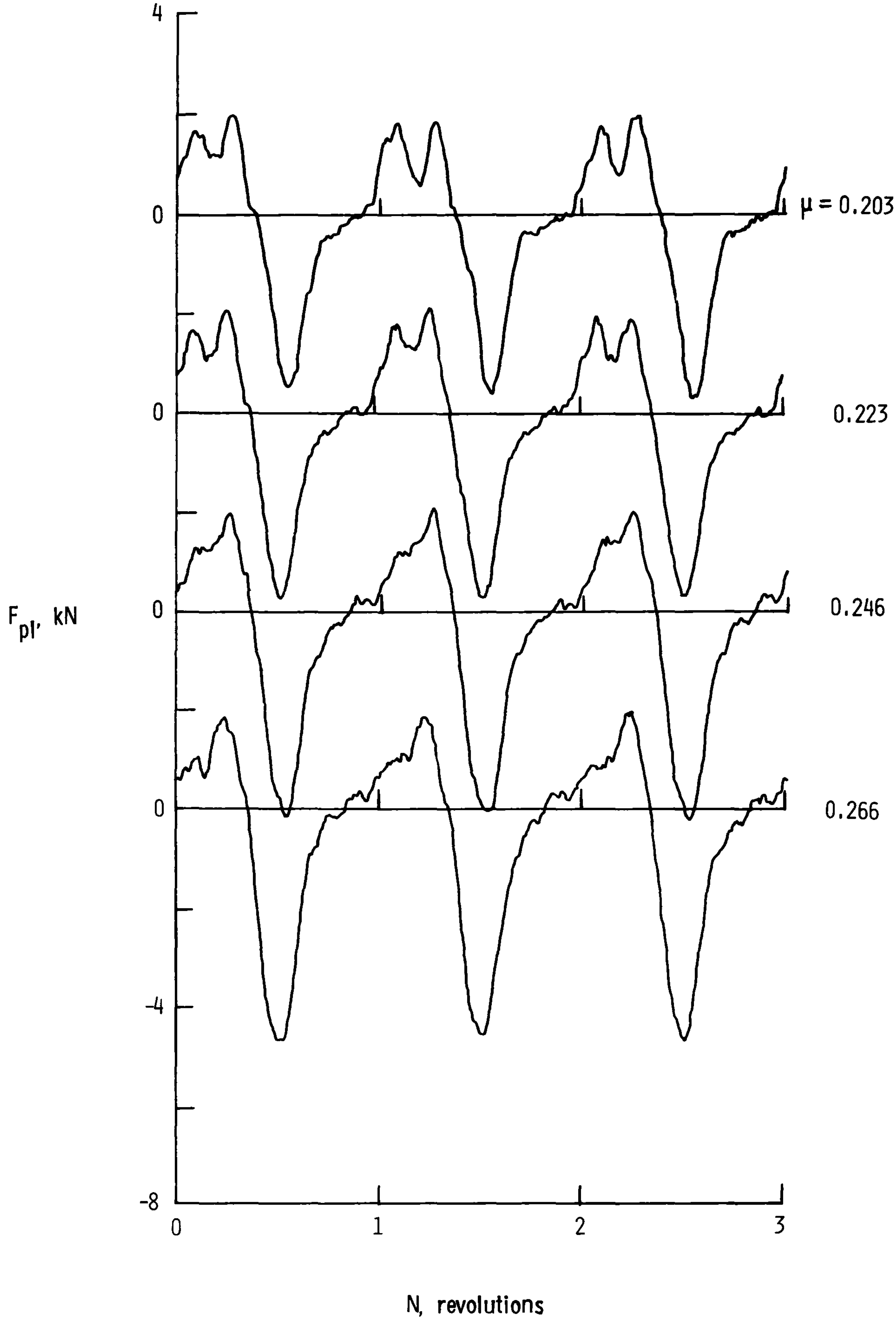



Figure 17.- Continued.

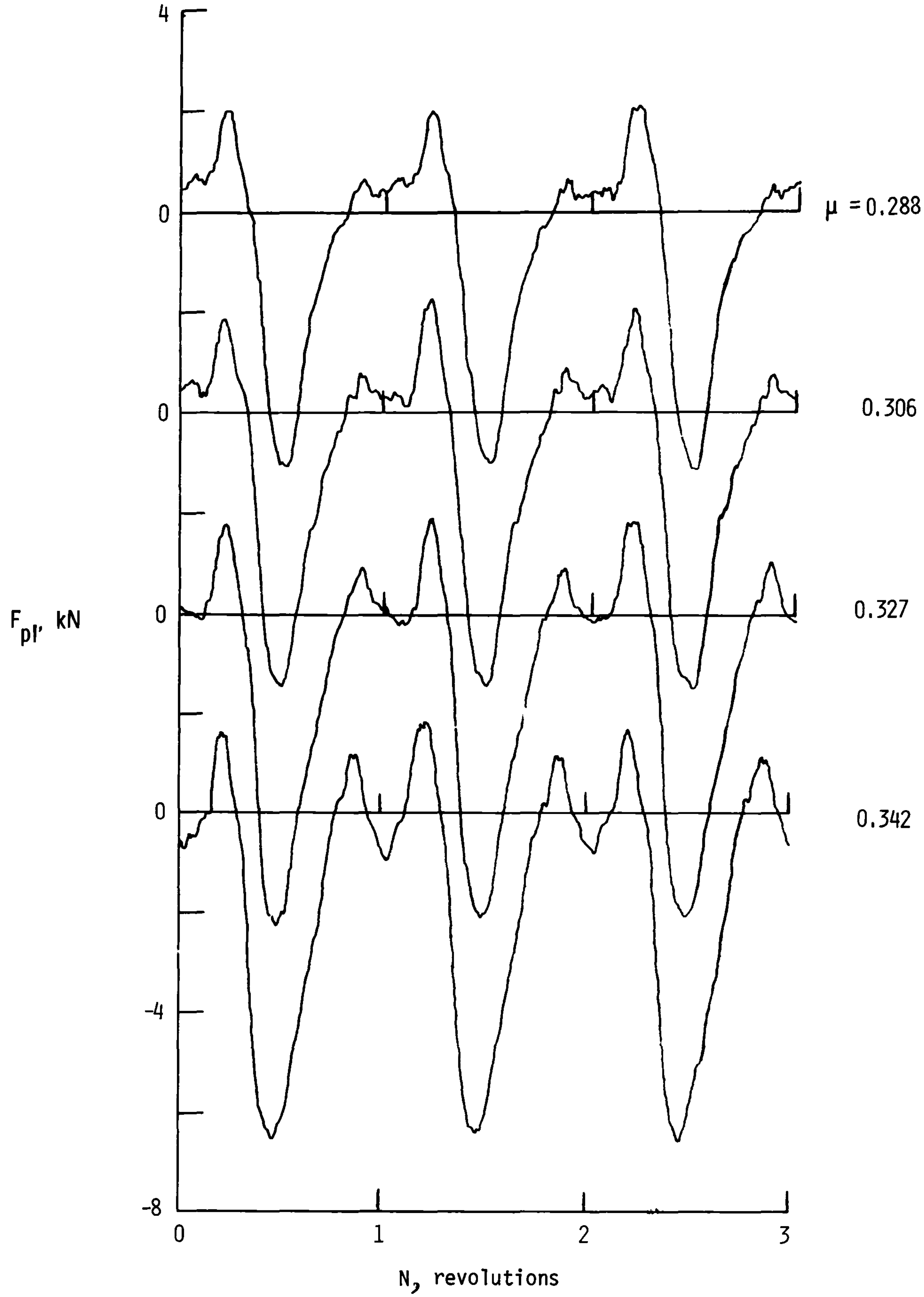



Figure 17. Concluded.

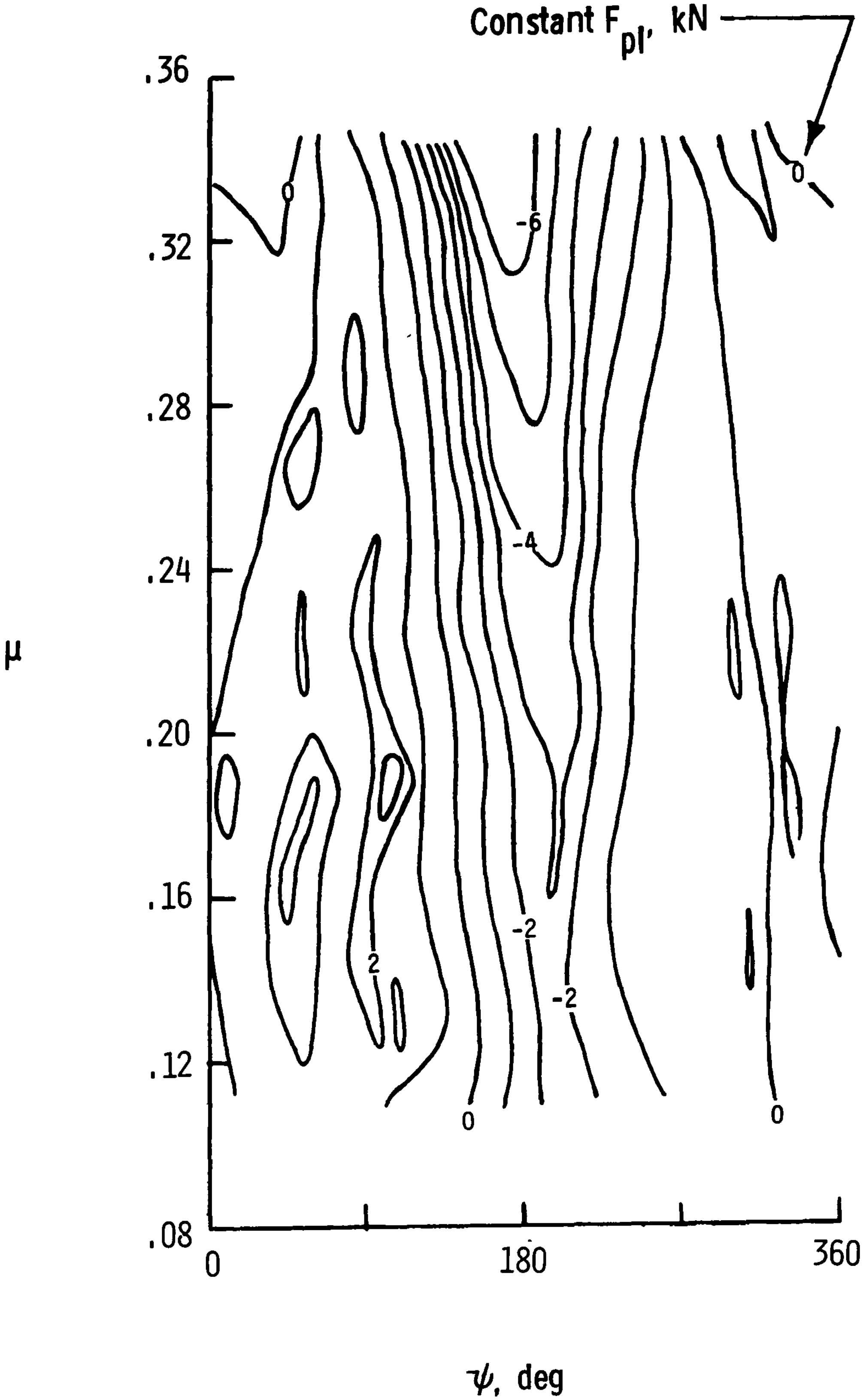



Figure 18.- Occurrence of specific values of pitch-link load as a function of rotor azimuth and tip-speed ratio. $\bar{M}_n$ = 0.69; $\bar{C}_L'$ = 0.0039.

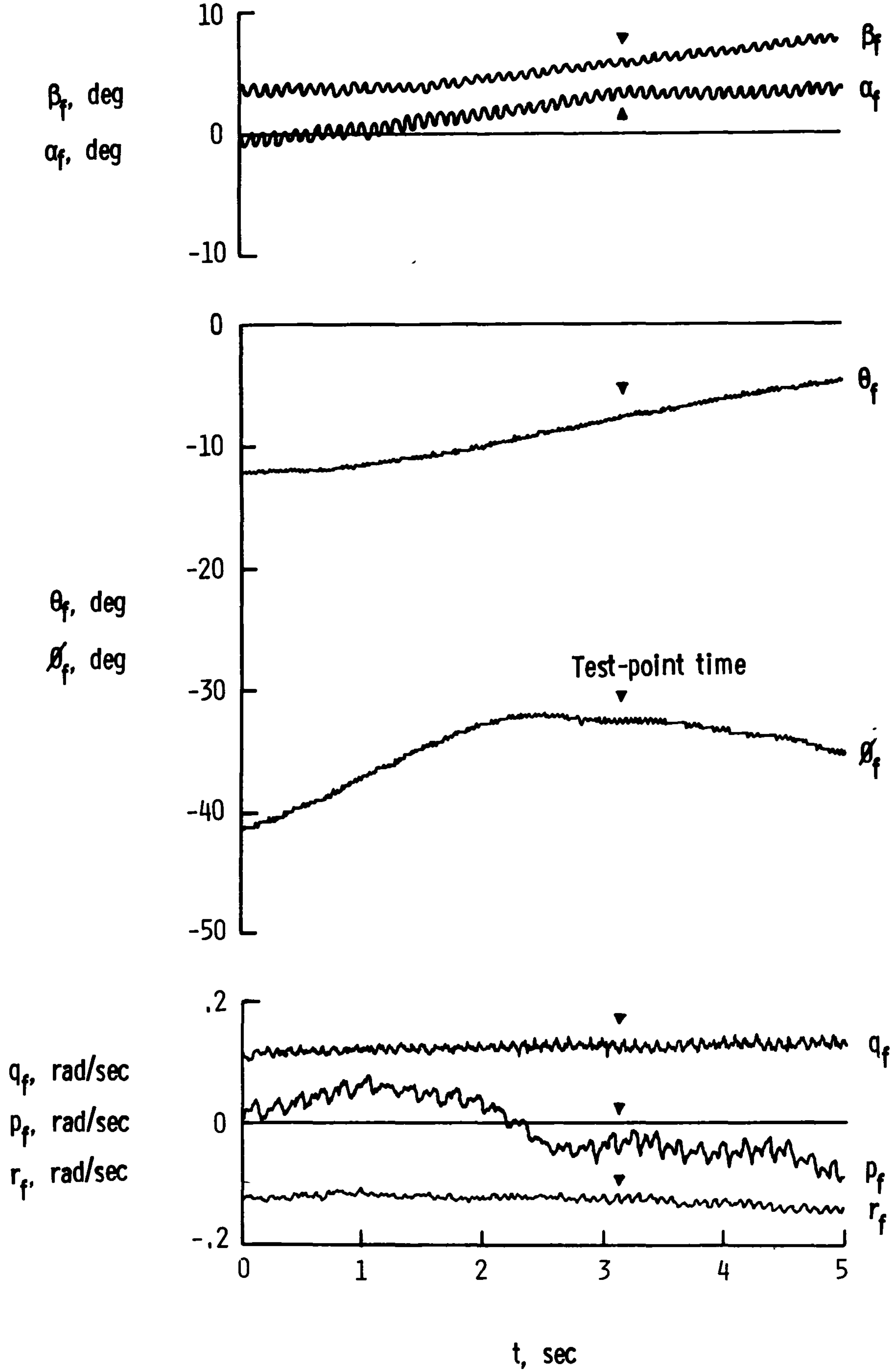



Figure 19.- Flight-state and control parameter histories for a descending left turn (Test point for flight 27, run 11B of Appendix C); measured, uncorrected parameters. $C_L' = 0.0058$; $\mu = 0.24$.

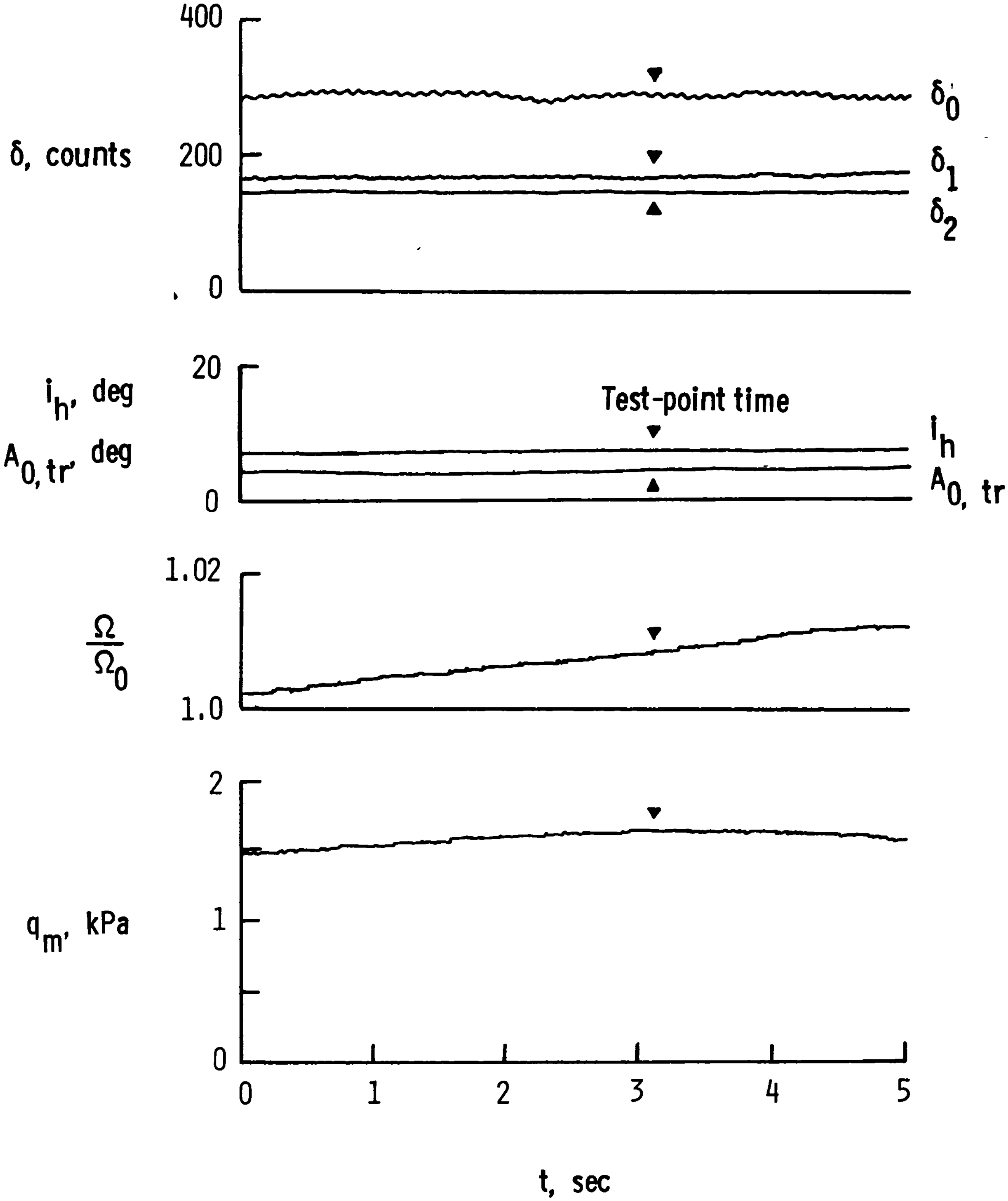



Figure 19.- Continued.

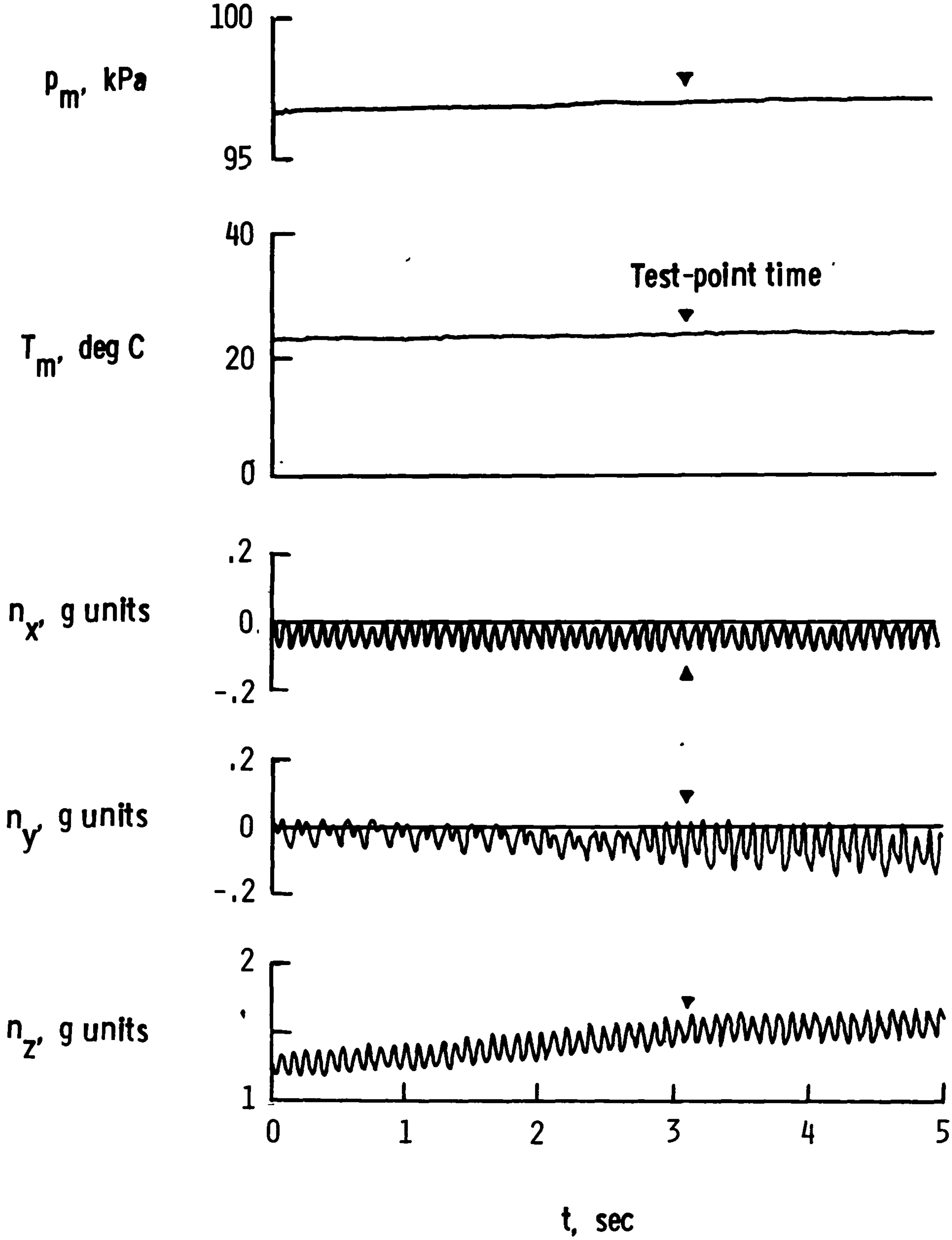



Figure 19.- Concluded.

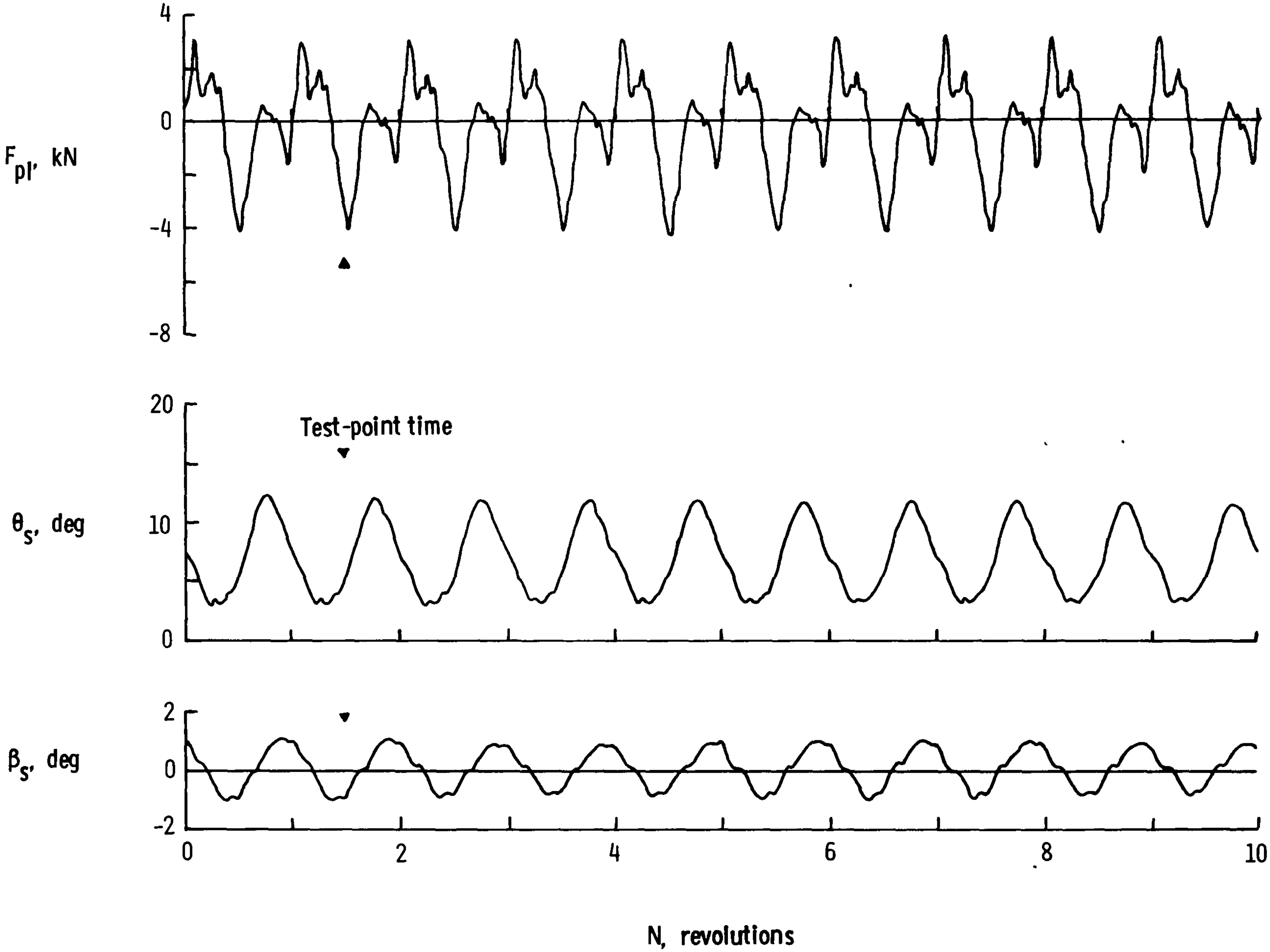



Figure 20.- Rotor data records for a descending left turn (Test point for flight 27, run 11B of Appendix C). $C_L' = 0.0058$; $\mu = 0.24$.

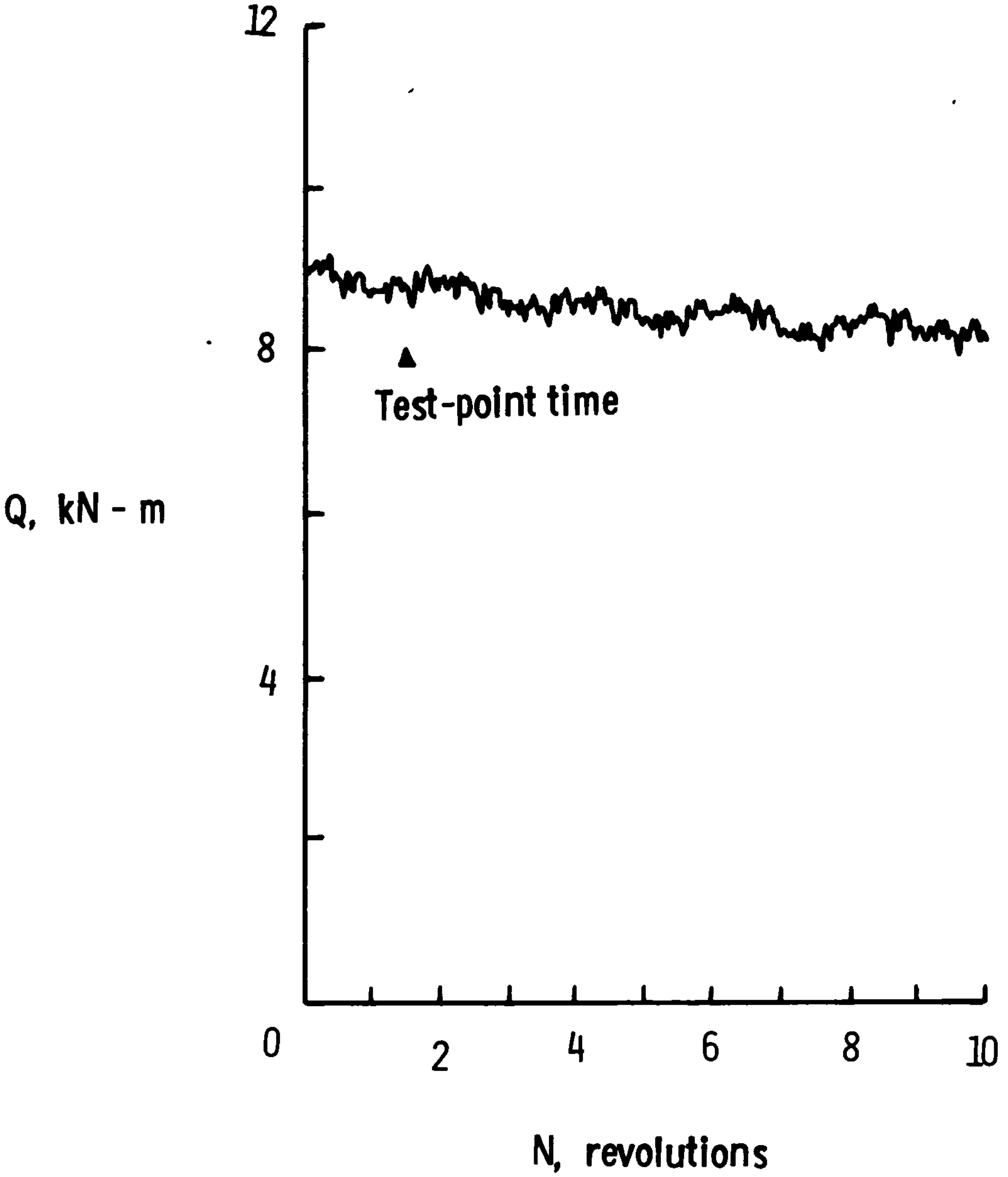



Figure 21.- Mast torque record for descending left turn (Flight 27, run 11B of Appendix C).

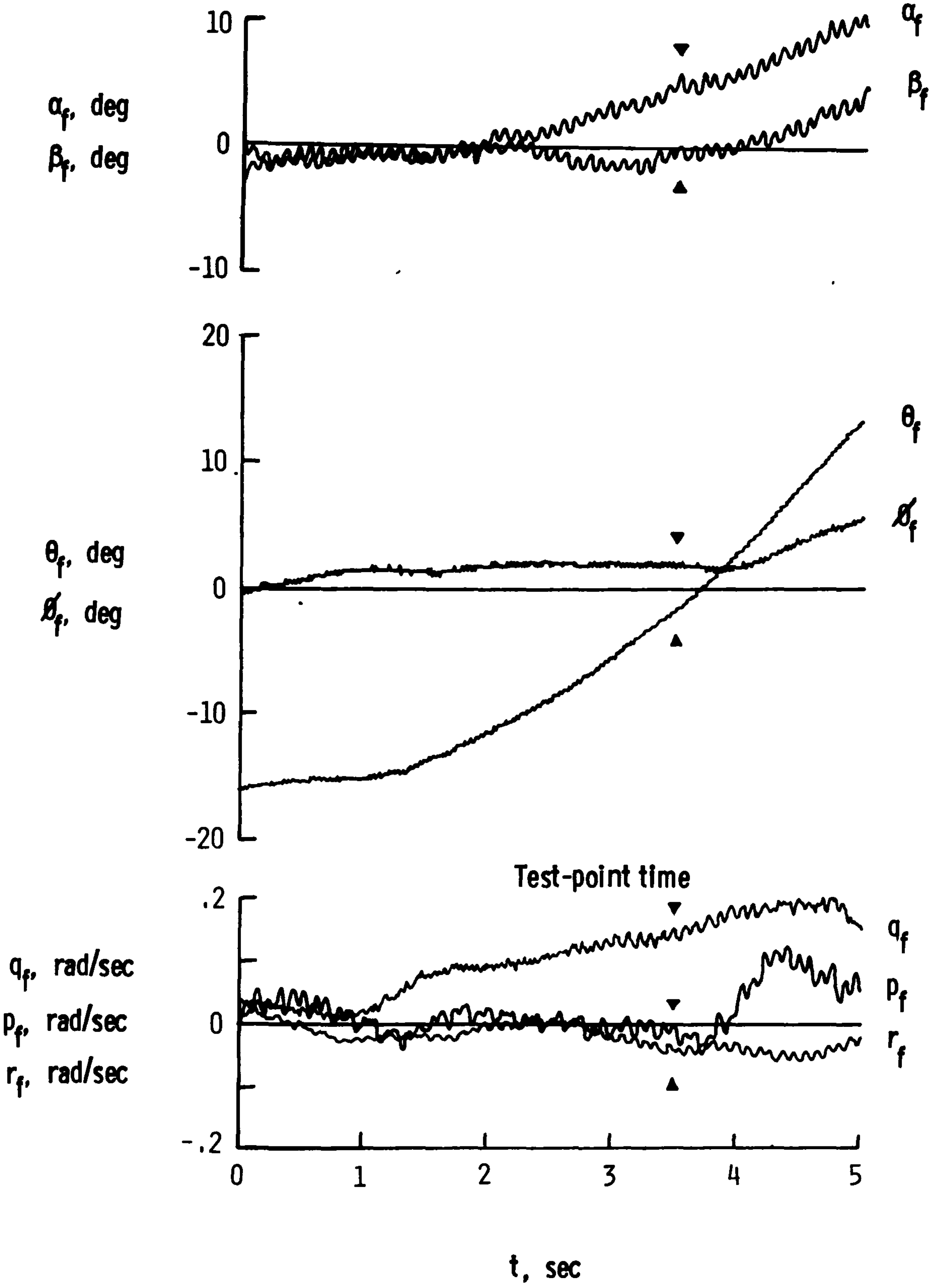



Figure 22.- Flight-state and control parameter histories for a symmetrical pull-up (Test point for flight 27, run 3D of Appendix C); measured, uncorrected parameters. $C_L' = 0.0064$; $\mu = 0.25$.

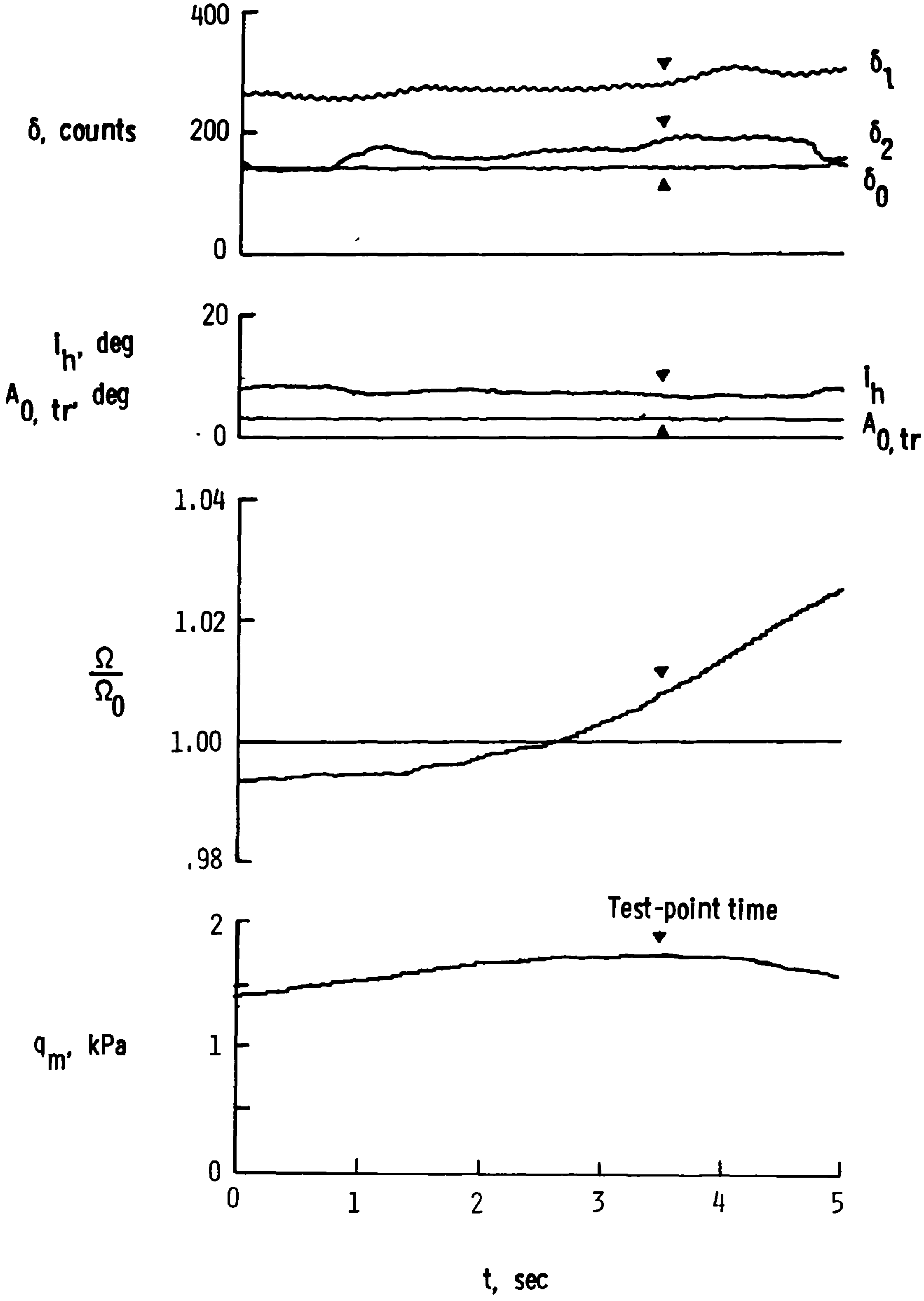



Figure 22.- Continued.

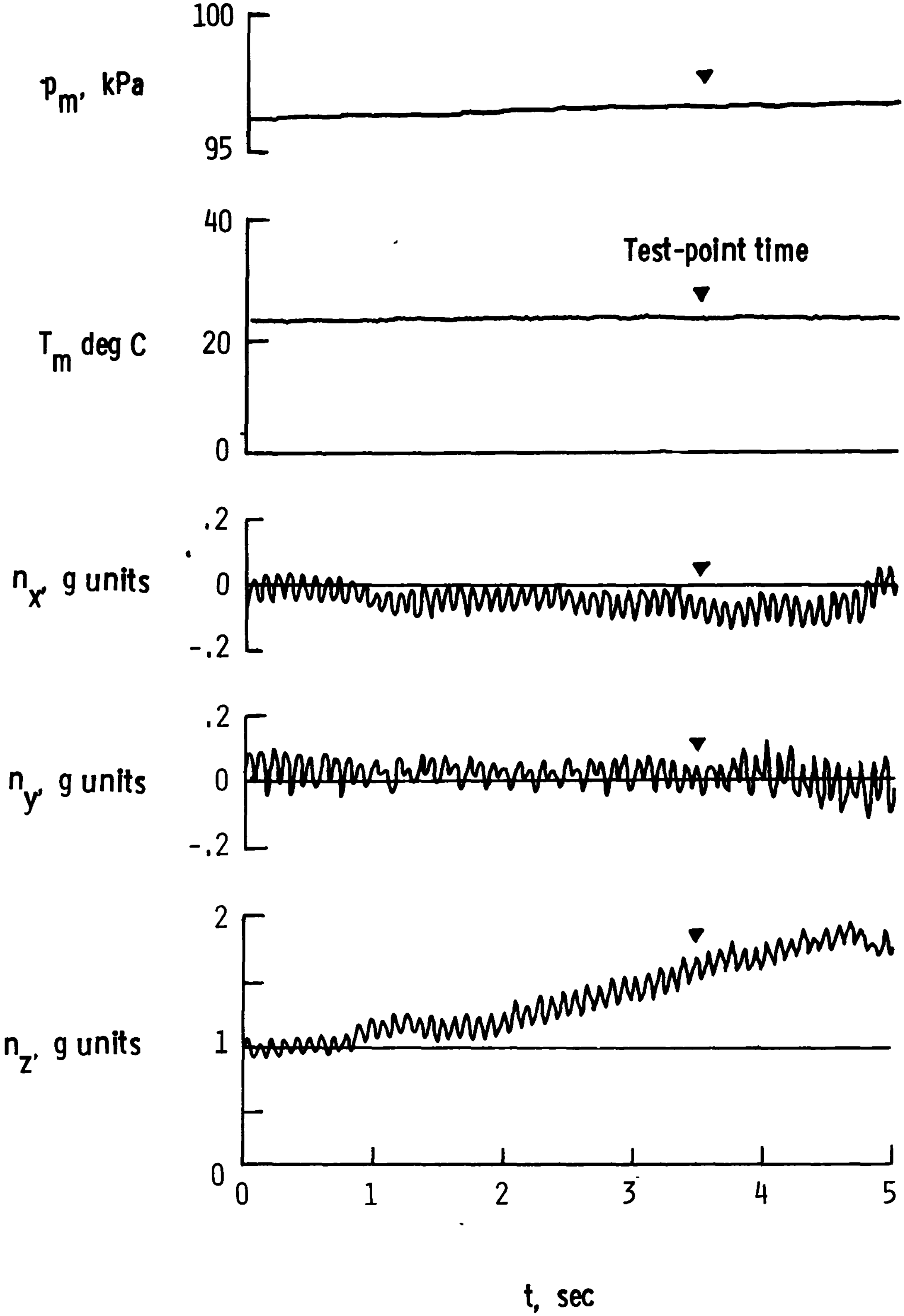



Figure 22.- Concluded.

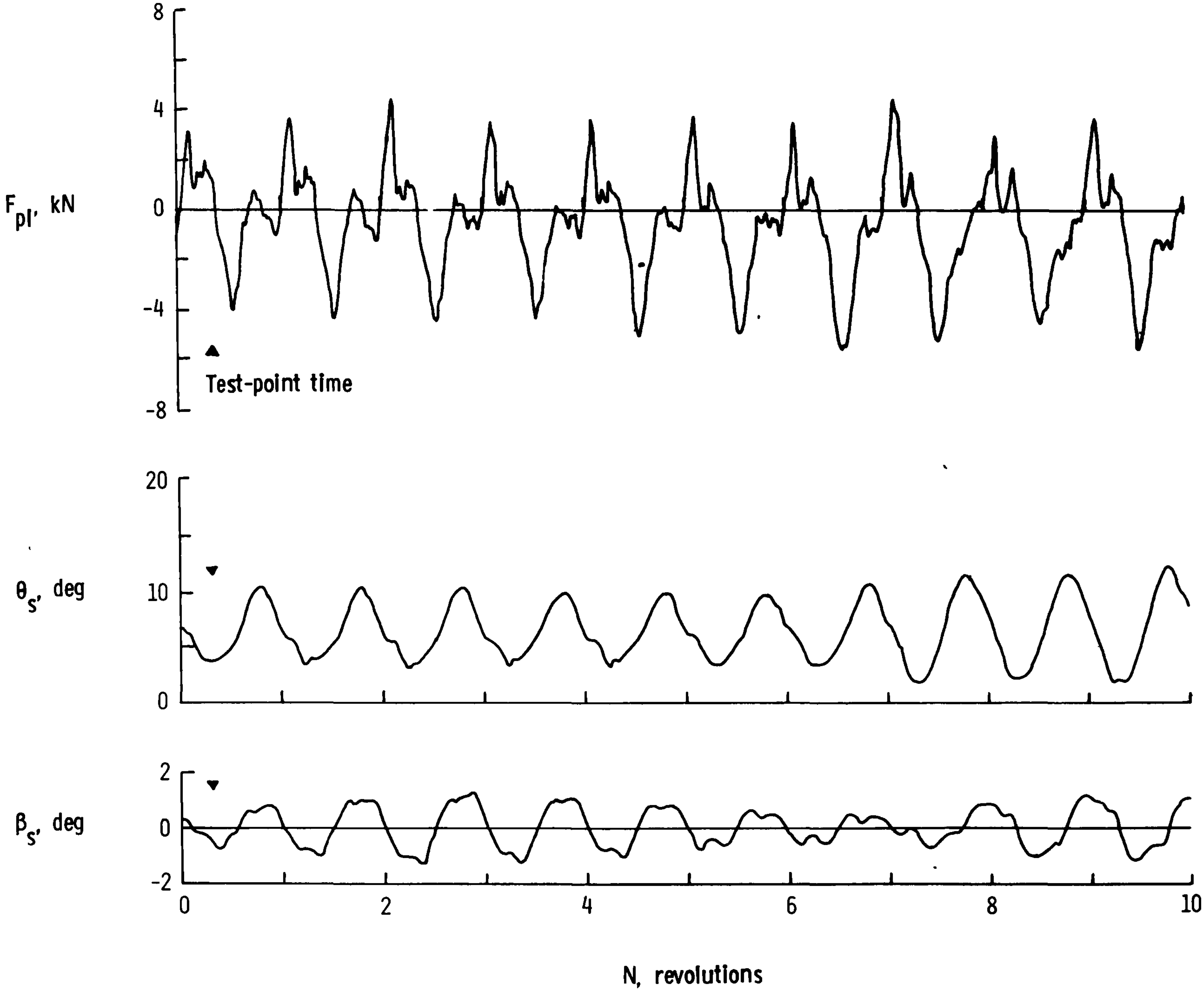



Figure 23.- Rotor data records for a symmetrical pull-up (Test point for flight 27, run 3D of Appendix C). $C_L' = 0.0064$; $\mu = 0.25$.

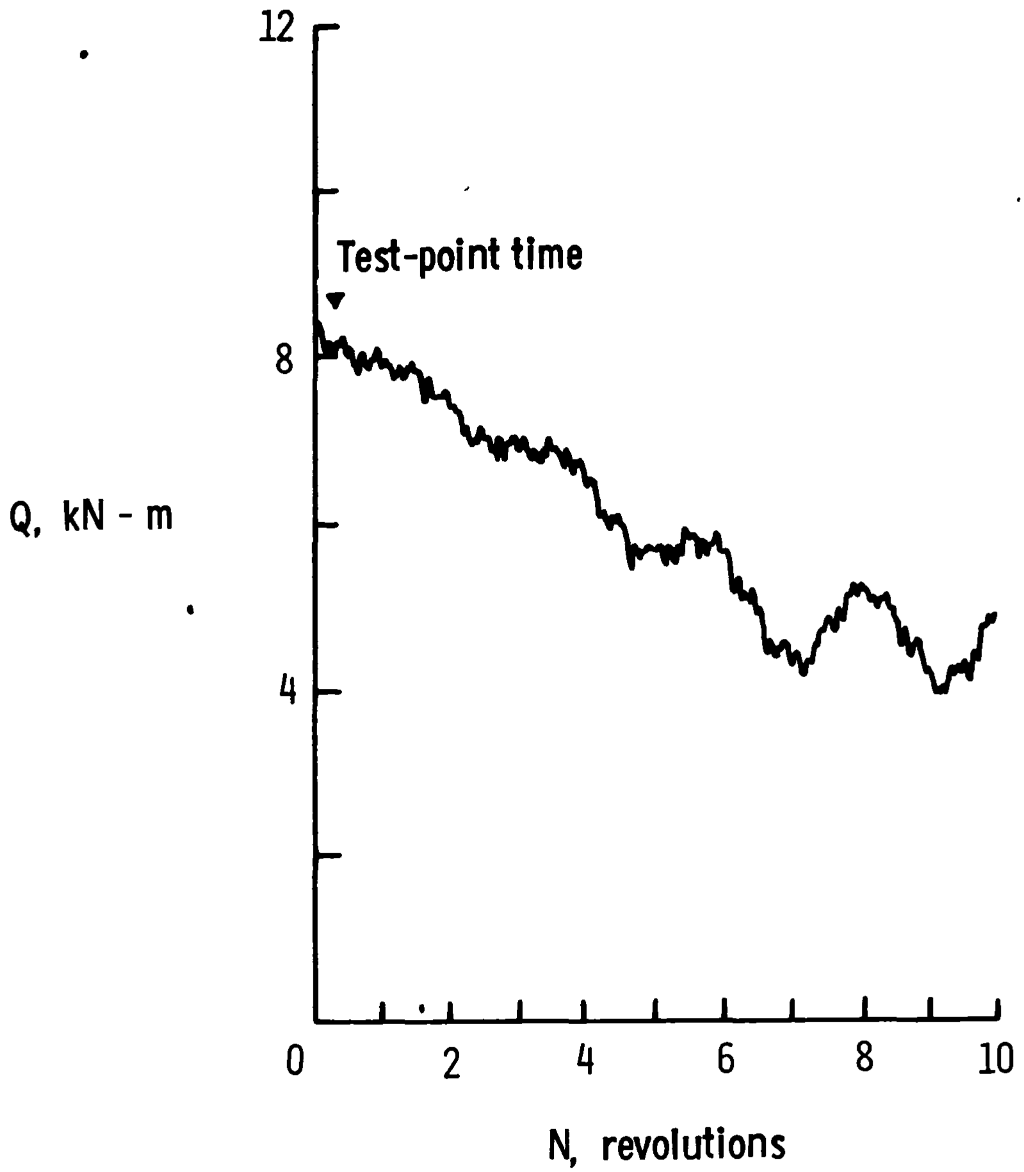



Figure 24.- Mast torque record for symmetrical pull-up (Flight 27, run 3D of Appendix C).

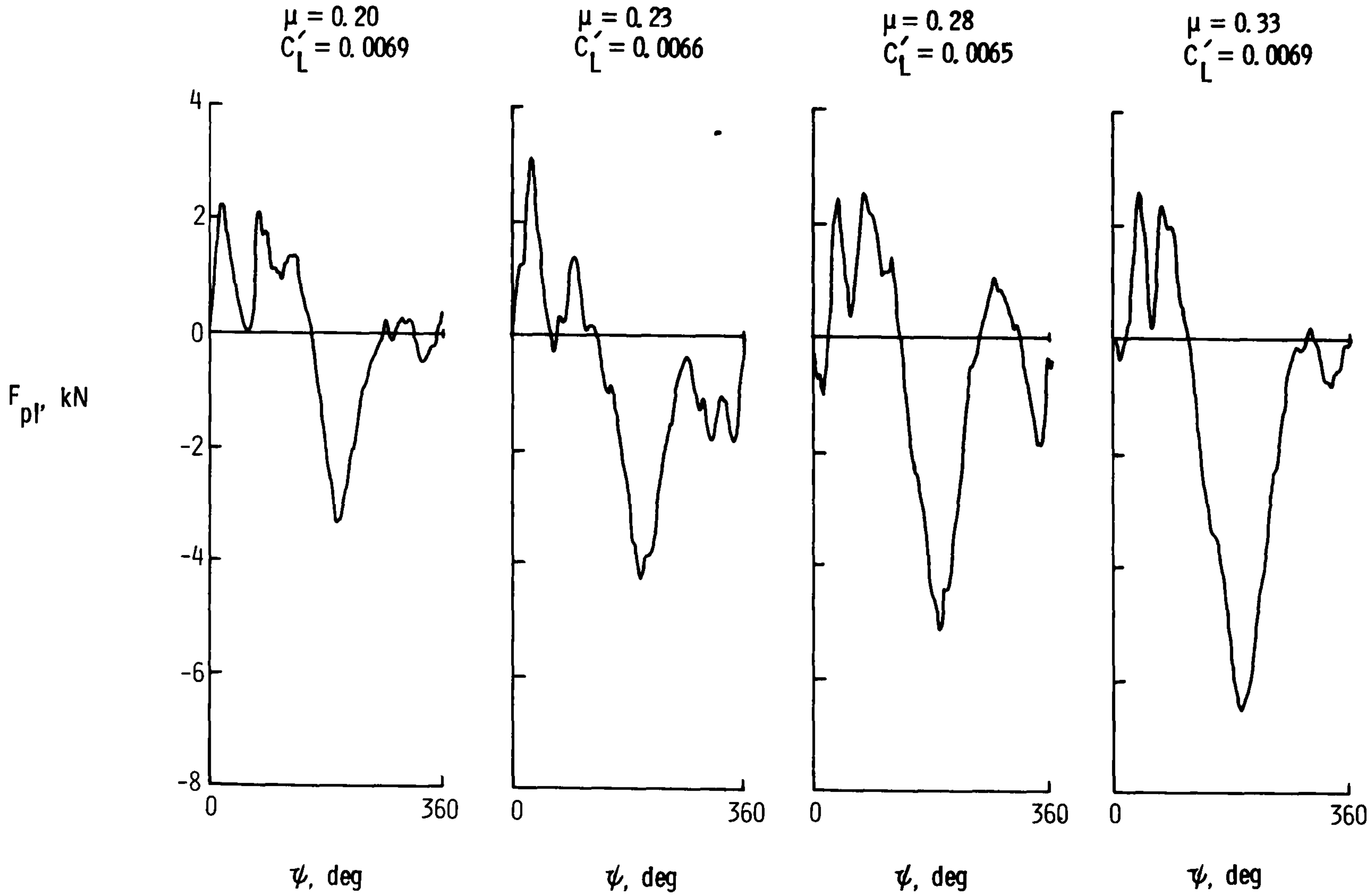



Figure 25.- Typical records of pitch-link load for descending right turns. $M_h = 0.66$.

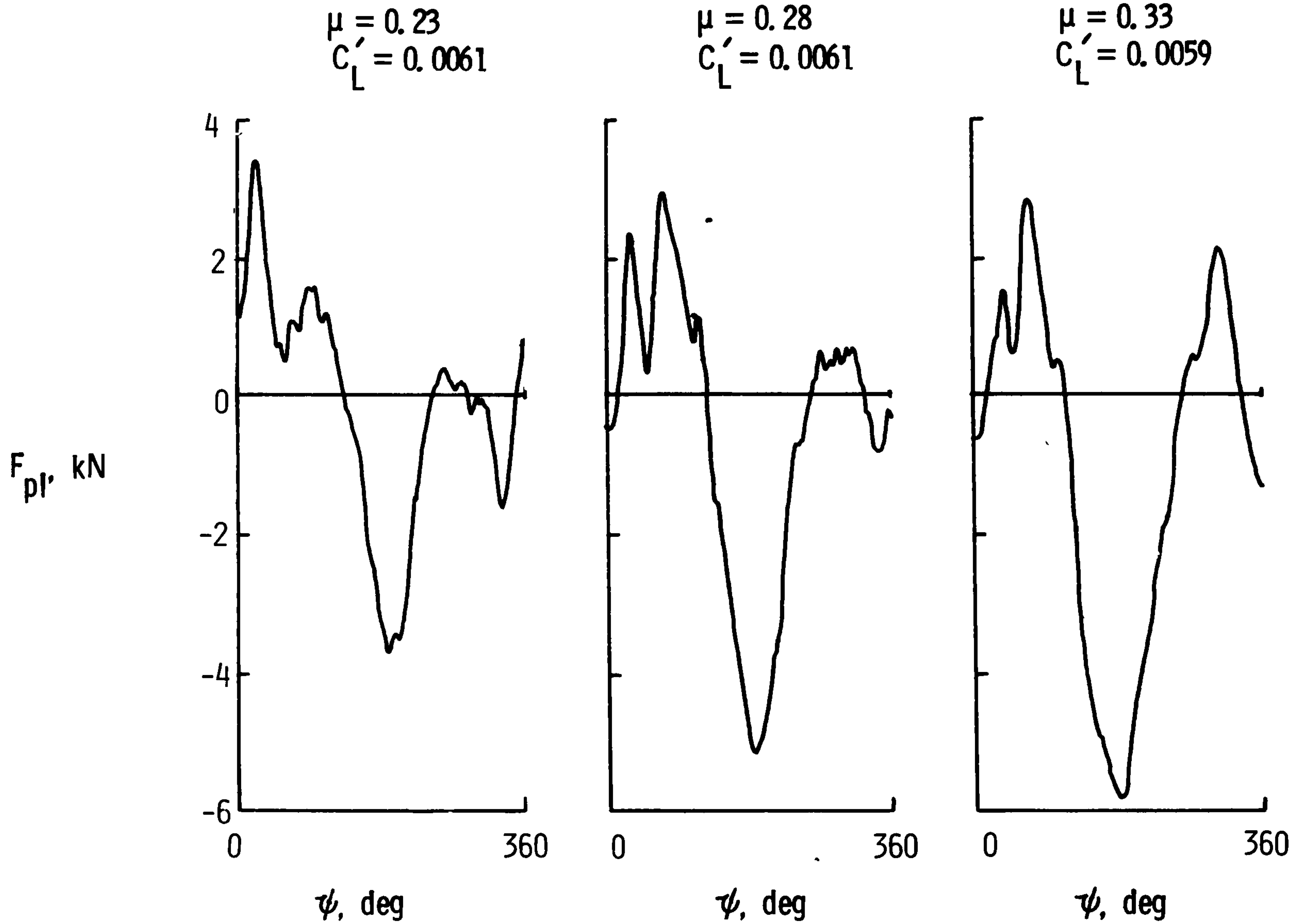



Figure 26.- Typical records of pitch-link load for descending left turns. $M_h$ = 0.66.

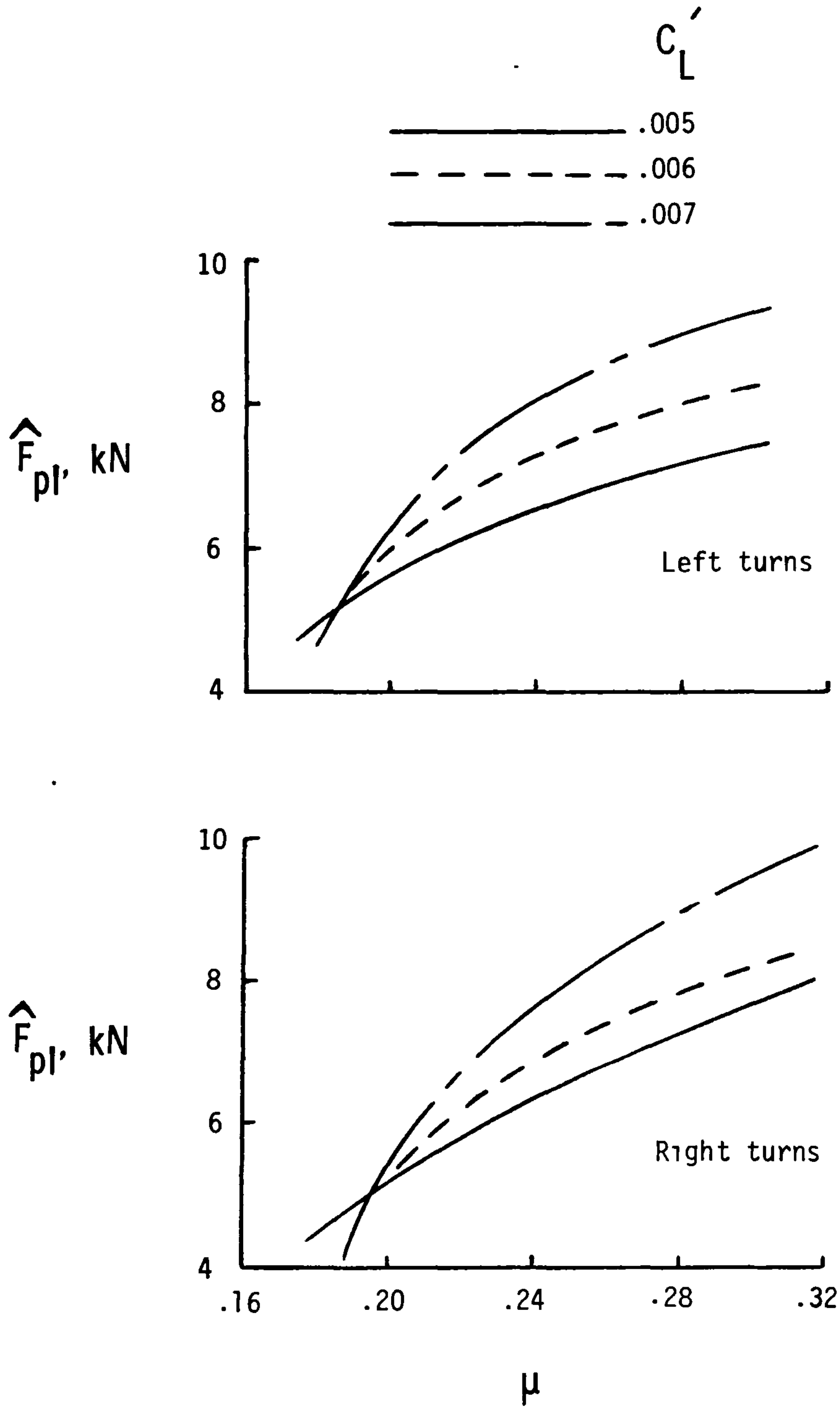



Figure 27.- Trends in peak-to-peak pitch-link loads with variations in tip-speed ratio and vehicle load coefficient.

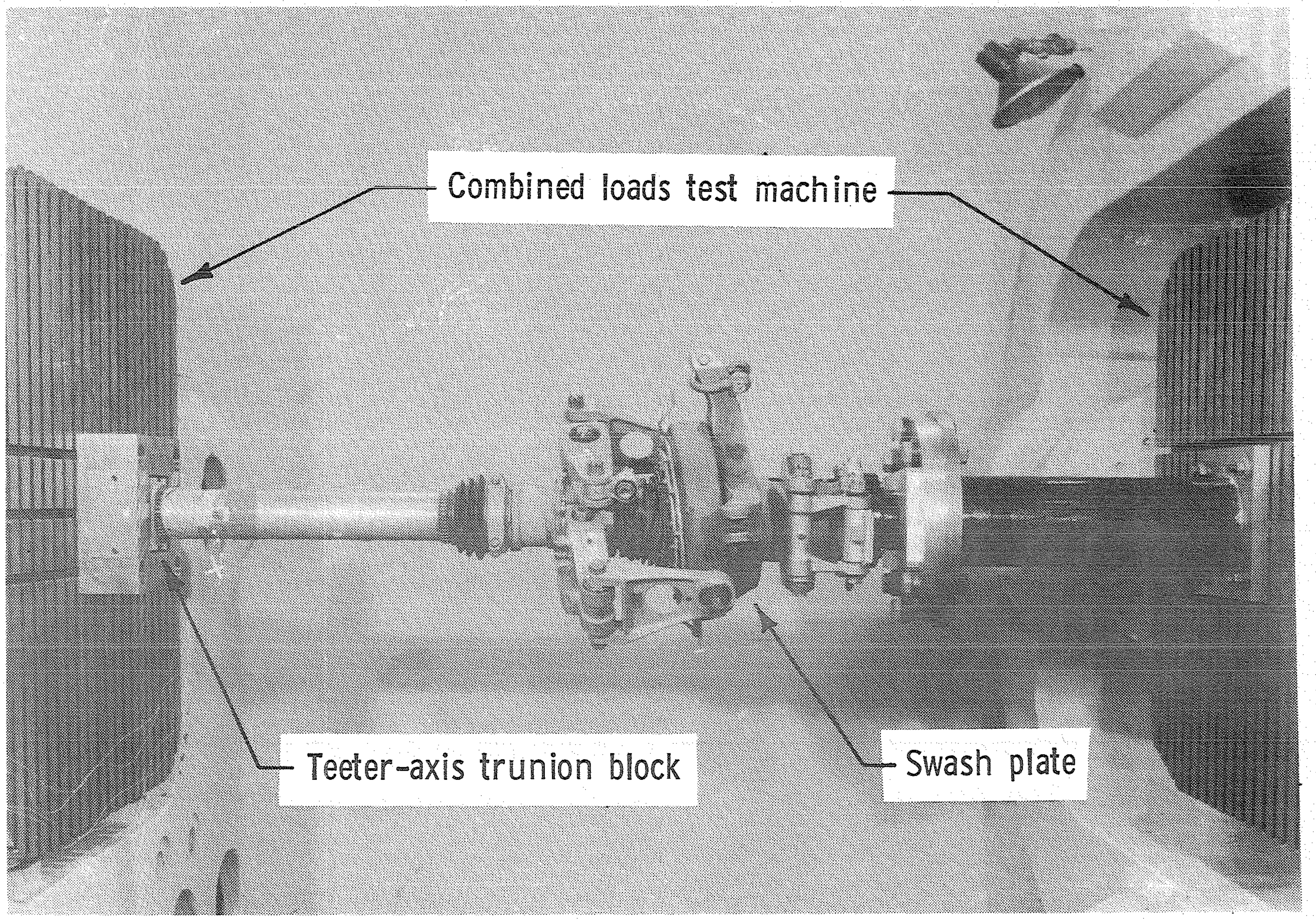



Figure 28.- Main-rotor mast and load calibration machine.

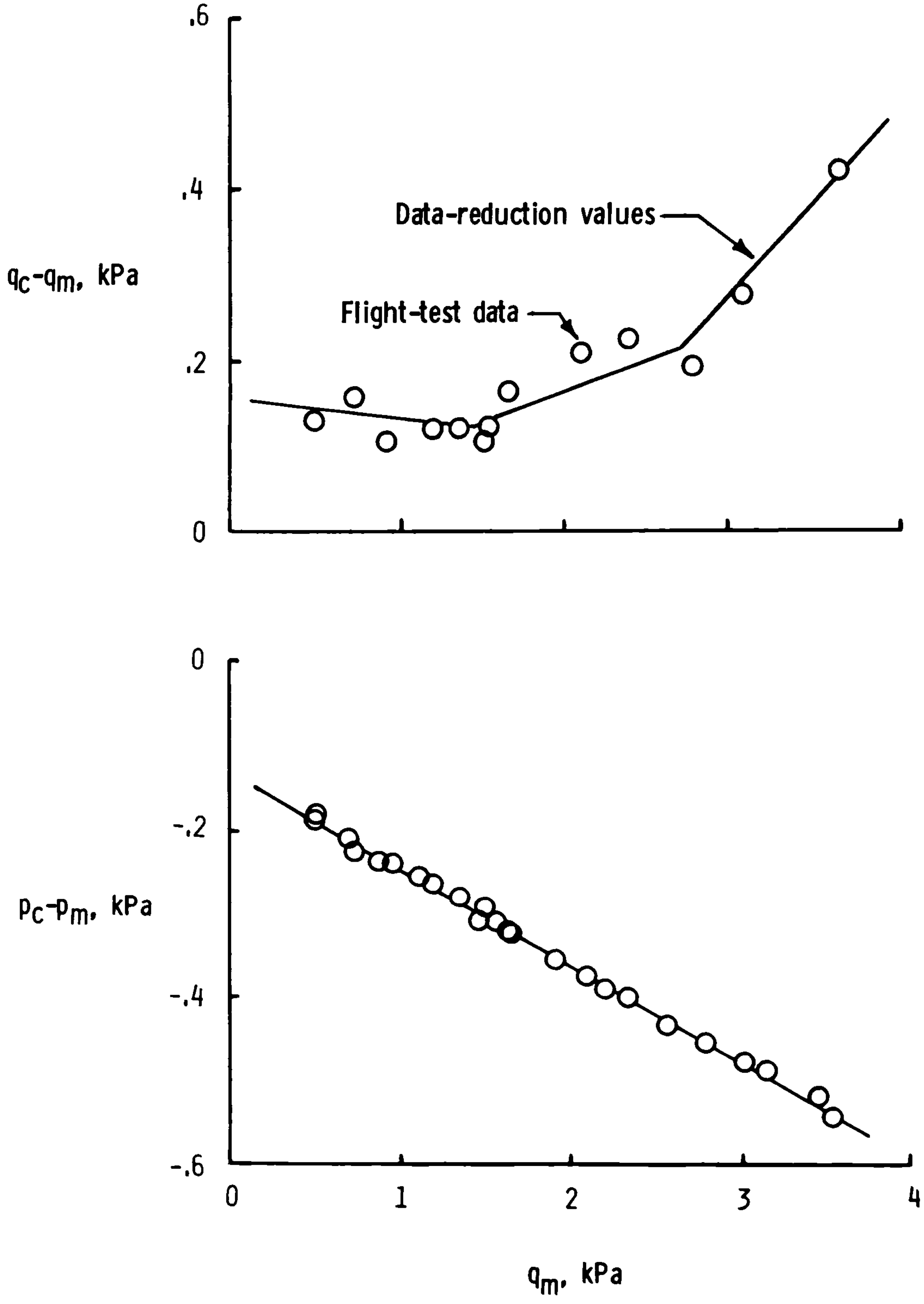



Figure 29.- Corrections for static and dynamic pressure based on radar-tracked calibration flight.

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